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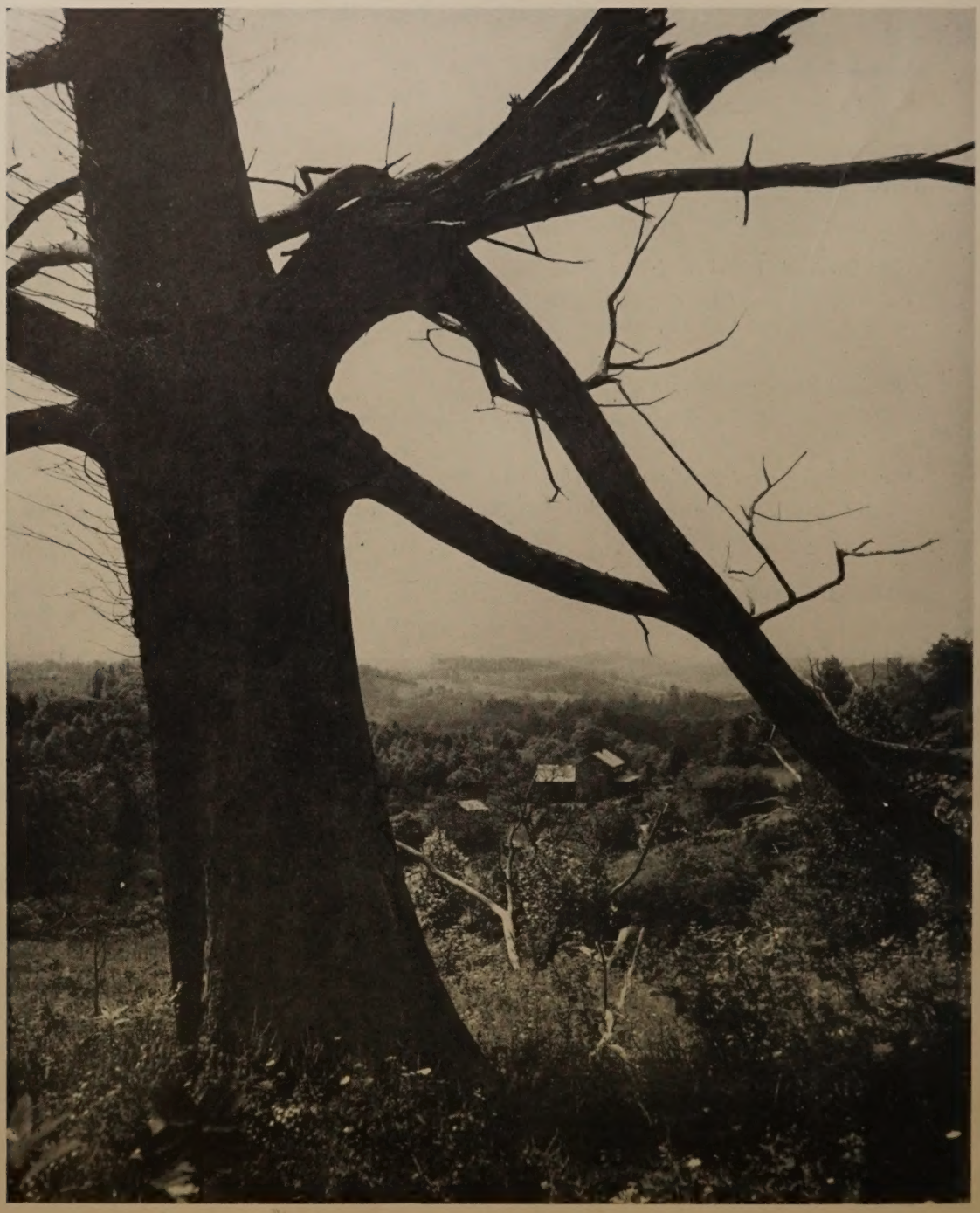


Dead chestnuts on the Blue Ridge Plateau, Virginia.

Chestnut Blight
In Asia and North America

By G. FLIPPO GRAVATT

AMONG the trees of the world, chestnuts, *Castanea* spp., are outstanding because they produce large crops of tasty nuts and numerous valuable products such as durable posts, lumber, and tannin-extract wood. The forest stands of the American chestnut, however, have been destroyed by two serious fungus diseases, blight and phytophthora root rot (ink disease). Both these diseases are serious on European chestnut also. In part of Europe the ink disease has seriously damaged that species and now the blight, already found in Italy and Spain, is an immediate menace to chestnut throughout that continent. In contrast, Asiatic species of chestnut are resistant to both these diseases.

Chestnut blight is caused by a fungus named *Endothia parasitica*. This fungus grows in the bark, cambium, and outer wood of affected trees. Within the bark and cambium region the fungus growth appears as characteristic buff-colored fans (page 5). These fans indicate the presence of the blight. However, if the chestnut tissue has been injured or partially killed by freezing or some other factor, the blight fungus will grow through it without forming fans. On the outer bark surface the fungus produces reddish-brown fruiting bodies about the size of pinheads and of two types. Under moist conditions sticky tendrils of spores ooze from one kind of fruiting body. These spores are spread by birds, animals, and insects; the other type of fruiting body produces wind-borne spores.

Usually the first symptom of the disease to be noted outwardly is the dying of a limb to which are attached yellow-brown leaves that contrast with the green of the rest of the tree. On examination of such a limb, a girdling blight canker will be found. Sometimes the cankered area is swollen, and sometimes it is sunken (page 6); but slicing away the bark will always disclose the fungus fans if the blight is the primary cause of the canker. On some trees, even of susceptible species, the blight fungus may grow extensively in the outer bark for four or five years before it extends into the cambium region and then kills the tree.

Asiatic Chestnuts and the Blight

There are four species of the genus *Castanea* in Asia. The Chinese chestnut, *Castanea mollissima*, is a medium-size tree much used for orchard and home planting. This species is reported by Chinese authorities to reach a height of 15 to 18 m. (50 to 60 ft.) in forests. It is not so upright growing as the American chestnut and shows quite a tendency to spread out when not crowded. In two plantings in the eastern United States, 22-year-old Chinese chestnuts growing on good sites are 15 m. (50 ft.) tall and are still rapidly increasing in height. Perhaps this species may do better as a forest tree in the United States than in China. The nuts range in size from 55 to 275 to the kilogram (25 to 125 or more to the pound) and are quite sweet, decidedly sweeter than Japanese chestnuts. Orchard production is mostly on a seedling rather than a grafted variety basis. The range of the tree in China extends from north of the Great Wall in the vicinity of Peiping south to Yunnan, and to the Kwangsi and Kwangtung provinces. The Chinese chestnut is also planted in northwestern Korea.

The Chinese chestnut shows general resistance to the blight in both China and the United States of America. Under good growing conditions, where the trees are not weakened by such factors as freezing, defoliation, or crowding, most of the trees are highly blight-resistant. The disease may be present in the outer bark of the trunk, especially in limb crotches and near the ground, without extending into the cambium region. However, on limbs that are weakened by shading, the fungus may grow into the cambium region and hasten death of the part. Abundant reddish-brown fungus fruiting bodies are then produced on the dead limb. Small trees are sometimes girdled and seemingly killed back to the ground by the blight, especially when they are weakened by late spring freezes, but most of them send up vigorous sprouts. Some such sprouts that have been under observation in the United States for 15 or 20 years have shown no further damage from the blight.

In China there are at least two other species of the genus *Castanea*, namely, the Henry chinkapin, *Castanea henryi*, and the Seguin chestnut, *Castanea saguinii*. The Henry chinkapin is a tall forest tree, up to 30 m. (100 ft.) in height. Because it produces a small single nut in the bur, it is classified as a chinkapin. This tree grows in central and eastern China but is not frequent. The blight has not been reported on it in China, but in the United States this

American chestnut attacked by the blight.

species is more susceptible than the Chinese chestnut. The Seguin chestnut is a small, bushy plant. It is very prolific, produces three nuts to the bur, and under some conditions continues blooming even into the fall. The blight has not been reported on this species in China, and in the United States the species is very resistant to the disease.

The Japanese chestnut, *Castanea crenata*, is widely distributed in Japan and southern Korea as a forest tree and is extensively planted in Japan as an orchard tree. Many horticultural varieties are known and their nuts vary greatly in size. Some large ones run 11 to the kilogram (5 to the pound), while some of the wild forest Japanese chestnuts are about the size of the American chestnut and run 275 to the kilogram (125 or more to the pound). The blight is widely scattered in Japan but is not abundant. It sometimes injures orchard trees. In the United States the Japanese chestnut has been more susceptible to the blight than the Chinese chestnut and in general it is less hardy.

Destruction of the American Chestnut

Chestnut blight was first reported at New York City in 1904. It spread rapidly and eventually killed all the American chestnuts in its natural range in the eastern United States (page 6). Sprouts continue to come up from the base of the killed trees, and sometimes these sprouts bear crops of nuts. However, they in turn are usually killed before they reach a height of 6 m. (20 ft.).

In the southeastern United States there are in the genus *Castanea* several species of chinkapin, ranging in size from small, low, flat-growing shrubs to trees sometimes 30 cm. (1 ft.) or more in trunk diameter. All of these species are susceptible to blight, and large numbers have been killed by it. Blight has not yet been reported from the Ozark Mountains, west of the Mississippi River, where the largest of the species, *Castanea ozarkensis*, is native, but in time it undoubtedly will be found there.

From 1912 to 1914 an effort was made by the State of Pennsylvania, with the co-operation of the United States Department of Agriculture, to stop the spread of blight. The program was based on insufficient knowledge, because later studies showed that the disease was more widely distributed in different States than was suspected at that time and was exceedingly hard to control. The State control work undoubtedly delayed the spread of the blight for some years and gave owners of millions of acres of chestnut more time to market their timber stands. It was found that advance small spot infections could be kept from spreading, even though located in the midst of continuous growth of highly susceptible trees. However, very careful work was necessary, including burning of all parts and treatment of the peeled stump with creosote. Frequent reinspection for several years was necessary, as nearly always some infected trees were missed. The fungus fruits on untreated stumps, on chips or pieces of bark that are missed, on small twigs, and on exposed roots. Anyone attempting eradication, even on

a less susceptible species like the European chestnut, must take extreme precautions.

The difficulties, but also the success, in holding the blight in check are shown by the work on the Pacific Coast of North America. The first infection was found on European and Japanese chestnuts at Agassis in British Columbia. The infected trees were cut out, but the disease reappeared on several other European chestnuts, which in turn were destroyed. A second infection was found in the State of Oregon, originating from a shipment of chestnut nursery stock from the infected eastern States. This was cut out in 1929 and again in 1934, and no further infection has been found there. A third infection, at Seattle, in the State of Washington, presumably originated from a planting of infected nuts of the American chestnut that came from the eastern States. The infected trees were destroyed and no further disease has been noted at Seattle.

In 1934 the blight was found in several irrigated orchards of European chestnuts in California. All infected trees were immediately burned by State authorities and all known chestnut trees in the State were inspected by State and Federal pathologists. Each year since then a few infected trees have been found in the previously infected orchards, and these have been burned. Inspection and control are supplemented by a rigidly enforced embargo that prevents shipments of chestnut nursery stock into California from the infected eastern States. Another important factor which should contribute to the successful stopping of the blight is the isolated character of the plantings, with no known susceptible host plants in the vicinity. In contrast there frequently were 4,000-8,000 highly susceptible trees per km^2 (10,000-20,000 to the square mile) in the eastern chestnut forests. Such a concentration of susceptible trees provides ideal conditions for spread of the disease and makes it difficult for inspection to locate all infections. The inability to eradicate the disease in California has therefore been puzzling.

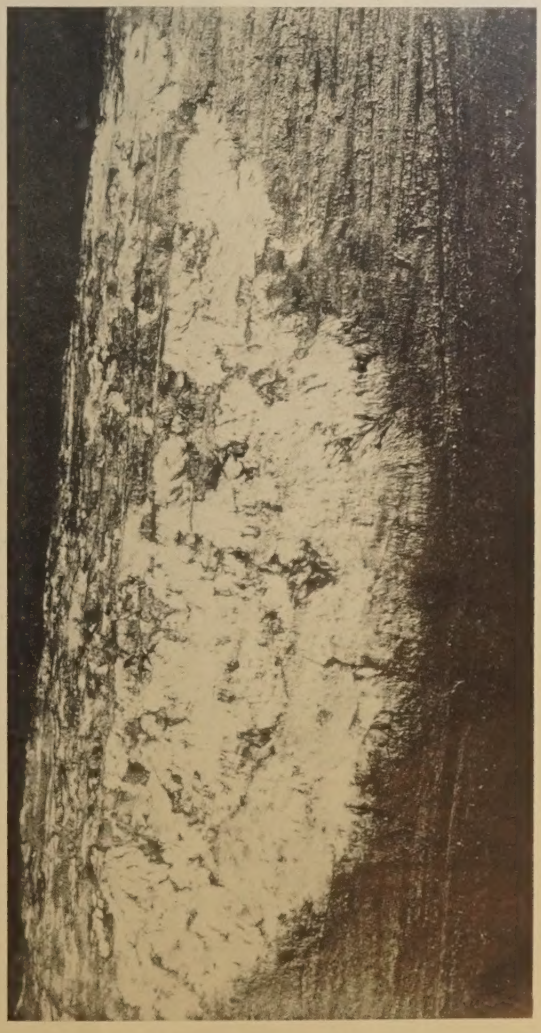
A point of interest about the blight in California is its apparent virulence on the seedling European chestnuts. Although the trees were growing under the best of conditions, the cankers continued to enlarge, with only a little evidence of any resistance to the enlargement as indicated by callus formation. European chestnuts in the eastern United States have in general shown more resistance than the American chestnut to the blight before being killed, but none under observation has shown as much resistance as the ones reported by Professor A. Pavari in Italy.

The chestnut blight fungus grows and fruits also on a number of species of oak. Occasionally typical cankers form on twigs or branches of the chestnut oak, *Quercus montana*. The fungus gains entrance through wounds into the wood of a number of native oaks, grows inwards for several inches, but seems to cause little damage. The only native American oak that so far has been damaged is the post oak, *Quercus stellata*. In many areas this widely distributed tree, with a standing volume of over 23 million m^3 (r) (5,000 million bd. ft.), is seriously damaged by the blight. Some trees have their tops killed, some have open cankers along their trunks; on many others the fungus grows in the outer bark without reaching the cambium and doing any damage. However, a large proportion of the trees exposed to the blight for 25 years are not damaged. The blight has not been found on post oak outside the area where chestnut has been killed.

In addition to the oaks, related species of *Castanopsis* from Asia and one from the Pacific Coast have been killed by the blight fungus in greenhouse inoculation tests. Sometimes the fungus grows as a saprophyte on red maple, *Acer rubrum*, shagbark hickory, *Carya ovata*, and staghorn sumac, *Rhus typhina*.

Blight-Resistant Chestnuts in the United States

The search for American chestnut resistant to the blight is still unsuccessful. Thousands of trees have been reported as resistant; hundreds of the best of these have been propagated for further testing,



Mycelian fans of the chestnut blight fungus. On most specimens only scattered small fans will show, not an extensive fan growth as shown here.

A sunken and swollen canker on American chestnut.

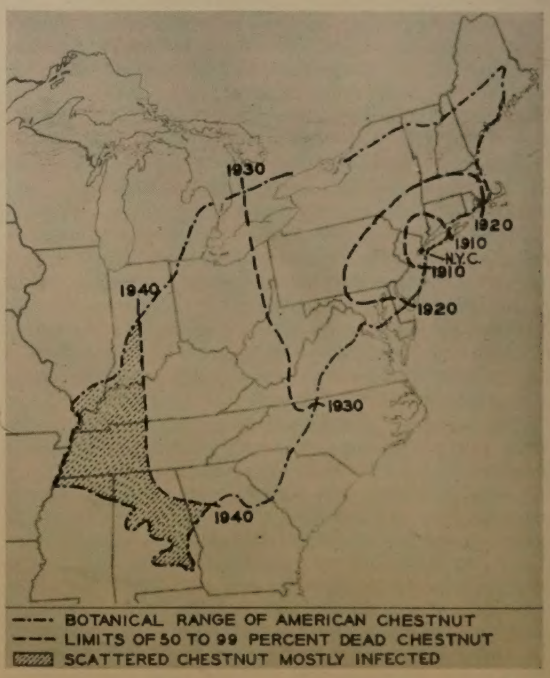
which is still under way, but to date there is no selection considered sufficiently resistant to warrant propagation. Considering that the host chestnut covered millions of acres over a wide climatic range, it is quite remarkable that all trees seem to be so susceptible to the blight. In the areas where the blight has been present 25 years or more, a very few large trees are still alive and struggling against the disease, but each year a few more of them die. Sprouts are prevalent everywhere.

The European chestnuts and their hybrids growing in orchards or as ornamentals in the eastern States have nearly all been killed by the blight. The most extensively planted variety, the Paragon, had been grafted on American sprouts and these were quickly killed.

Forest plantings of Chinese chestnuts made by Dr. J. D. Diller of the Division of Forest Pathology, U. S. Plant Industry Station, in the eastern United States have grown well on deep, fertile soils with good air drainage. On old, abandoned fields, however, the plantings nearly always failed. Even on good sites, the best results were obtained by girdling the present forest growth and allowing the chestnuts to grow up with protection of these girdled trees with less deterioration of site than is usual with clear-cutting. Trees grown from seed of certain selected trees of the Chinese chestnuts give better growth and are hardier than are those from other trees. The tannin content of the Chinese chestnuts grown in the United States equals or is slightly higher than that of the American chestnut, which still supplies most of the vegetable tannin produced in this country (Fig. 4).

Some State conservation, forest, and wildlife departments are now growing Chinese chestnuts and distributing them to farmers for woodland plantings. The Chinese chestnut seedlings are being widely planted as orchard and ornamental trees in the eastern United States. Two private nurseries, for instance, are each advertising 75,000 seedlings for sale this year. A limited number of trees of grafted varieties are planted now, but as the supply of grafted trees increases they will be more extensively used.

Breeding to combine some of the desirable characteristics of the different chestnuts is under way by Mr. R. B. Clapper of the Division of Forest Pathology, U. S. Plant Industry Station, and Dr. A. H. Graves of Hampden, Connecticut. Most of the F_1 hybrids between the Asiatic chestnuts and the American chestnut have been susceptible to the blight, but the progeny of one cross made by Mr. Clapper is very promising. The Chinese chestnut used in this cross came originally from Tientsin in China. A few of the sixteen surviving plants of this cross are shown on page 7; though each of them has the blight fungus growing in the outer bark, so far these have not been damaged. It will be many years before the final value of this hybrid as a forest tree is determined, but it is by far the best one secured among many Asiatic and American hybrids. Unfortunately, crossing F_1 Chinese-American or Japanese-American hybrids back on to the Asiatics to secure more resistance usually results in a loss of the vigorous upright growth habit of the American chestnut. Hybrids between the other Asiatic chestnuts and American chestnuts and chinkapins are under test but so far nothing of outstanding value has been secured.



Map showing the rate at which chestnut blight spread over the Eastern United States. The dated lines show the extent of the heavy infection at the time indicated.

The dead chestnut trees are chipped up at this plant, the tannin extracted, and the chips then used for pulp products.

Pollen from some of the Chinese hybrids and selected pure Chinese trees has been sent by air mail to Professor A. Pavari at Florence, Italy, for the past two seasons. Use of this pollen on bagged flowers of European chestnuts has given hybrid nuts both years. Nuts and scions from the United States have also been sent, but the viable pollen gives quicker results in combining the desirable qualities of the European chestnuts with the selected trees from this country. World-wide airmail service will especially facilitate tree breeding since most trees must grow many years before they produce pollen.

The tragedy of the destruction or threatened destruction of the chestnut in many lands should serve as a warning against the dangers of tree diseases spreading from one country to another, especially since the phenomenal increase of airplane transportation enhances this danger.

Photos by courtesy U. S. Forest Service

Hybrids between the American and Chinese chestnuts. Note the vigorous upright growth, characteristic of the American parent. Flowers are being bagged to secure the F_2 generation.

Chestnut Blight in Europe

By ALDO PAVARI

THE first appearance of *Endothia parasitica* in Europe was announced in Italy in the province of Genova by Professor Paoli in 1938, and the parasite was identified by Professor A. Biraghi of the Plant Pathology Station of Rome. By 1939 the infection had extended from the province of Genova to the bordering province of Alessandria. Sanitary measures considered sufficient to control the infection were adopted immediately but the disease continued to spread rapidly. By 1940 the disease had appeared in the province of Udine in serious form. It can readily be seen from the accompanying map that many of the most important chestnut-producing areas in Italy have been infected by this disease in the ten years following its discovery. The situation is especially serious along the Apennine Range from Liguria to Tuscany where the nut-producing chestnut forests cover a great deal of hill country and represent one of the principal economic resources.

Distribution of Chestnuts in Europe

The chestnut assumes more importance in Italy and those countries bordering on the Italian frontier and on the Mediterranean basin than in other European countries. This can be readily seen from the geographical distribution of the chestnut in Europe. It extends into a zone outside the area influenced by the Mediterranean climate, but it is only in the Mediterranean regions of Europe that it can be cultivated as a nut-bearing tree to any considerable extent. The chestnut thrives where there are warm summers and mild autumns with lengthy days of sunlight, freedom from late frosts, and a relative abundance of rainfall —conditions to be found in the hilly regions of the Mediterranean countries.

In Portugal, where the maritime climate with its high moisture content makes it possible to cultivate the chestnut in non-hilly country, the area covered by the chestnut is 85,228 hectares. In this country the chestnut is used principally as a source of timber and, to a less extent, for its nuts. Chestnut timber production is estimated at 426,000 m^3 i.e., 4.8 percent of the total timber output of Portugal.

Cultivation of chestnut in Spain is limited by its moisture requirements. It is found chiefly in the Pyrenees and Biscay. Here it is grown, principally for its nuts, in numerous chestnut groves and sometimes on pasture or farm land. According to statistics for 1933, the total area covered by chestnuts amounted to about 55,000 hectares. This area has certainly decreased, especially in the northern provinces where

the chestnut was most prolific, because the ink disease caused by *Phytophthora cambivora* has seriously affected the groves in the last twenty years.

In France, according to *Statistique Agricole Annuelle* for 1945, nut-bearing trees covered an area of 169,714 hectares, producing 110,562 metric tons of chestnuts. Here also, it is reported that the ink disease has very seriously affected the groves. The Island of Corsica contains the most extensive area of chestnut groves with economic importance, about 30,000 hectares.

In Switzerland, the chestnut is important only in the south, i.e., in the southern Grisons where chestnut groves cover an area of 9,405 hectares. The total number of trees is 886,000 and about 7,500 metric tons of chestnuts are produced annually.

In Greece, chestnuts cover an area of about 28,350 hectares, of which 15,285 hectares are in coppice forests. This area represents 1.5 percent of the total forest area of the country.

In Yugoslavia, the most important chestnut region is Dalmatia, where there are about 51,000 hectares of groves. Chestnuts are also found in those parts of Croatia and Slavonia which have mild climates, though not to the same extent as in Dalmatia.

There are no accurate data regarding the area covered by chestnut groves in Albania.

Economic Importance of Chestnut in Italy

The nut-bearing chestnut groves in Italy cover an area of about 450,000 hectares and, in addition to these, there are 400,000 hectares of chestnut coppice, so that a total of 850,000 hectares is devoted to this species. The province of Cosenza alone has 33,416 hectares of nut-bearing chestnuts, the province of Lucca

Blight on chestnut sprouts near Genoa.

Chestnut harvest in Italy.

39,590 hectares, the province of Cuneo 48,000 hectares, and others more. Thus Italy has the largest chestnut-producing area in Europe.

The production of chestnuts in Italy during the period from 1909 to 1913 averaged about 640,000 metric tons per year. From 1922 to 1925 it fluctuated around 500,000 metric tons per year, and from 1934 to 1936 it decreased to 350,000 metric tons. It is estimated that this last figure represents the present yearly production. Although the production of chestnuts has decreased considerably (for various reasons, such as the damage caused by the ink disease), it still represents a considerable economic factor. The value of the chestnut, as a nut producer, is exceeded only by the production from grape vines and olive trees. In addition, the export of chestnuts represents a favorable item in the Italian balance of trade. During the last twenty years exports of chestnuts fluctuated around 30,000 metric tons per year.

Chestnuts are not used entirely for human consumption. The nuts and the forage plants which are found among the open-grown trees in the chestnut groves provide an important source of fodder. The wood is used for fuel, construction, and manufacturing, but is of particular importance as the basic raw material for the tannin extraction industry which takes about two-thirds of the annual wood production.* Total production is estimated at 600,000 to 700,000 m^3 per year on the basis of 1.5 m^3 of timber per hectare of chestnut grove or forest.

The coppice chestnut forest, which covers about 400,000 hectares, represents one of the most characteristic aspects of Italian forestry and provides timber for agricultural, industrial, and domestic purposes. The earliest cuttings from chestnut coppice can be obtained in one or two years and are suitable for making baskets, wickerwork, small poles, etc. Later cuttings, up to a maximum of 25 to 40 years, yield timber for construction and manufacturing and, in particular, for telegraph and electric poles. The Italian chestnut coppice, especially in the volcanic soil of southern Italy, is highly productive and quite often reaches or exceeds a growth of 15 to 20 m^3 per hectare per year. Assuming that the average increase on the total area is only 6 m^3 per year, the total yearly production from coppice forests can be estimated at 2,400,000 m^3.

The chestnut trees in Italy are found principally in hilly country where they cover the slopes, protecting the soil from erosion. They are the source of employment and income for dense populations which, in the hill regions, depend upon them for a living.

Incidence of the Blight in Italy

Under these circumstances, it is easy to understand why the occurrence and spread of the chestnut blight in Italy following the serious damage already caused by the ink disease is a national calamity. The fight against this disease is one of the most important projects of the Italian Ministry of Agriculture and Forestry. An extensive research and experiment program has been assigned to the Silvicultural Experiment Station at Florence and the Plant Pathology Station in Rome.

The present incidence of *Endothia parasitica* in Italy is as follows:

Liguria: The whole of the provinces of Genova, Alessandria (1938), and more than half of the adjoining province of Savona (1938-1948).

Piedmont: Province of Cuneo; fairly extensive area at Bagnasco; a few trees at Chiusa Pesio and Mondovi (1948); province of Turin; two trees at Traves (1948); province of Vercelli; a small area near Biella (1948); province of Novara; all the eastern side of the Lake of Orta (1948).

Lombardy: Province of Pavia; fairly large areas at Varzi and Ponte Nizza (1946) and a few trees at Cilavegna (1948); province of Como; areas near Chiasso (Swiss frontier) and elsewhere towards the east (1948).

Venezia: The whole province of Udine (1939-1946).

Emilia: Province of Parma; small areas in the Taro Valley (1947-1948); Province of Modena; a fairly large area at Fanano (1947); province of Bologna; few trees at Gaggio Montano (1948).

Tuscany: Province of Apuania; a large area at Fivizzano (1947); province of Lucca; large and small areas in half the eastern side of the province adjoining the province of Pistoia; province of Pistoia; a large area at Cutigliano where the disease is spreading with great rapidity (1946-1948) and adjoining areas at Piteglio and S. Marcello; province of Florence; one tree near Vallombrosa (1948).

Latium: Province of Rome; a fairly large area at Velletri (1948); province of Latina (formerly Littoria) adjoining Velletri; many small areas on the hills

*At present there are 31 plants in Italy producing a yearly average of 40,000 metric tons of dry extract, having 60 percent tannin.

surrounding the reclaimed Pontine marshes (1946); province of Frosinone; small areas adjoining the previously mentioned ones at Ceccano and Veroli (1946).

Campania: Province of Avellino; the initial area severely infected at Baiano (1943) has spread to the western side of the province and small areas are to be found in the adjoining provinces of Benevento, Caserta, Naples (1947) and Salerno (1948) on the borders of the province of Avellino (1947).

Generally, all the newly discovered areas show blight which must have started about four to five years ago. In the province of Pavia the infected area of Cilavegna is very interesting because the chestnut trees existing there form a small group of old trees quite isolated from any other chestnut grove. The place is situated in a rice-growing district and the only other trees existing are poplars. The blight is located on the higher branches of the chestnuts and there is strong evidence that *Endothia parasitica* must have been carried there by birds. The rate of spread of the disease in the province of Avellino is amazingly slow as only a few infected trees can be detected over a large area. This is an interesting contrast to the severity observed in the initial area. Probably the slow rate of progression in the remainder of the district is due to climatic factors. Winds are rare, the atmosphere is very damp, and winters are mild.

Research Program and Fight Against the Parasite in Italy

The essentials of the program are listed below. The four divisions of the program are as follows: (1) Preventive and curative experiments; (2) Search for resistant varieties of *Castanea sativa;* (3) Introduction of oriental species of *Castanea;* (4) Hybridization.

Preventive and Curative Experiments

At first, certain legislative measures were adopted to eliminate the disease: cutting and burning the affected trees, disinfesting the soil, prohibiting the export of timber and of other chestnut products, etc. These measures proved to be ineffective, however, due to the vastness of the affected areas and the ease with which the parasite spread. They have been discontinued because, in addition to being economically unsound, they were useless from the plant health point of view.

An endeavor to find a direct cure was made in the province of Alessandria where infected branches were pruned and later burned. The blighted bark of the trees was cut out and iron sulphate solution was poured over the cut surface, but after one year this method proved to be completely ineffective.

Another method is to spray or pour various fungicides over the trunks of the trees. Many tests were made in the United States, but the results were not satisfactory. Nevertheless, it was considered advisable to persist in a trial of these methods in Italy. Last year, spraying with copper sulphate was tried out, and the trunk was injected with solutions of copper sulphate in various forms. The results have so far been negative, but injections of other fungicides will be tried.

An indirect method of attacking the disease has also been started which could be both preventive and curative, namely, the use of inorganic fertilizers. In this regard, it is worth recalling the research work carried out in the United States by Dr. A. H. [illegible] as a result of which it appears that the concentration of the protoplasm is a physiological characteristic of great importance with regard to resistance. Chemical fertilization can act in such a way as to increase this concentration apart from its effect on the vigor of the tree. It is still too early to draw any conclusions from the results but no great hopes are being built on the possible success of this method, especially since the chestnut blight has developed with the same intensity and persistence on the volcanic soils in the province of Avellino, which are very fertile and contain large quantities of phosphorus and potassium (elements required by the chestnut tree), as on poor soils. Another method being tried out is the use of the so-called minor elements, such as boron, manganese, etc. Here again, no great hopes for success are being held.

Owing to the importance of these experiments it is intended to persist with the trial of the curative methods, but nothing can be stated at present as to their effects, cost, or possibility of practical application.

Search for Resistant Varieties of Castanea sativa

The search for resistant varieties of *Castanea dentata* in the United States has given rise to both hope and disappointment since no positive results have as yet been achieved. Can the *Castanea sativa,* with its innumerable varieties cultivated in Europe, offer more hope of finding an isolated resistant variety?

Burning chestnut burs to produce potash for soil improvement.

Up to now many varieties of the European chestnut have been introduced into the United States, but all have proved to be susceptible to infection, though to a lesser degree than the American chestnut.

During the first ten years of the blight in Italy, it was found that numerous varieties of the nut-bearing chestnuts, including the wild chestnuts found in different infected regions, had all been attacked. Infection occurs in both high forest and coppice stands. However, the importance of finding a resistant strain among the mass of varieties of Italian chestnut trees necessitates continuance of the search. Therefore, cultivation of about 130 varieties of chestnut coming from all parts of Italy has begun in the forest nursery at Masone in the province of Genova, one of the places most seriously attacked by the disease. An experimental arboretum will be set up next autumn in the same locality to test the degree of resistance of the seedlings obtained. At the same time, accurate observations will be recorded in order eventually to identify the resistant varieties.

Experience with the blight in Spain. Experience gained in Spain encouraged the Italians to persevere. The Italian Study Mission to Spain composed of Professors Pavari, Biraghi, and Morettini went to Biscay in February 1947 to study the experimental cultivation of oriental chestnut trees conducted by the Institute of Experimental Forestry of Madrid. Blight existed on many of the *Castanea crenata* of the Tamba variety. However, on the trees of the indigenous varieties of *Castanea sativa* which existed in the immediate vicinity of the oriental chestnut plantation there was no sign of the blight except in the case of one tree which, although infected, evidenced a high degree of resistance to the disease. This fact was so surprising that the Spanish scientists were doubtful whether it really was an infection of *Endothia parasitica*. On the occasion of another trip made during the fall of 1947, under the auspices of FAO, Professors Biraghi and Pavari confirmed not only the complete absence of infection on the *Castanea sativa* but also succeeded in gathering material from which Professor Biraghi has isolated the parasite in pure culture and has found its identity to be the same as that present in Italy. Its pathogenicity is being tested on chestnuts in Italy, and Professor Biraghi has arranged with the Forest Research Institute of Madrid for the inoculation in Spain of the Spanish *Castanea sativa* with both the Italian and Spanish strains of *Endothia parasitica*.

The two principal centers of infection, at S. Roque and Elorrichueta, both in the province of Bilbao, are restricted to the Tamba variety, while the Shiba variety of the *Castanea crenata* showed no sign of infection. What is more surprising, however, is that the disease has not extended to *Castanea sativa* although the infection dates back many years and the climate, being relatively mild in winter with abundant and frequent rainfall, offers the most favorable conditions for the spread of the disease. The enigma may be solved by inoculating the Spanish chestnut trees with the fungus, or by cultivating them in infected areas and comparing them with the types of native chestnuts which have been attacked by the disease. For this reason about 100 kilograms of Spanish chestnuts were shipped to Italy from Biscay, which is very near the centers of infection observed by the Italian Study Mission, and from the provinces of Burgos and Granada. The chestnuts have already been planted in the nursery at Masone.

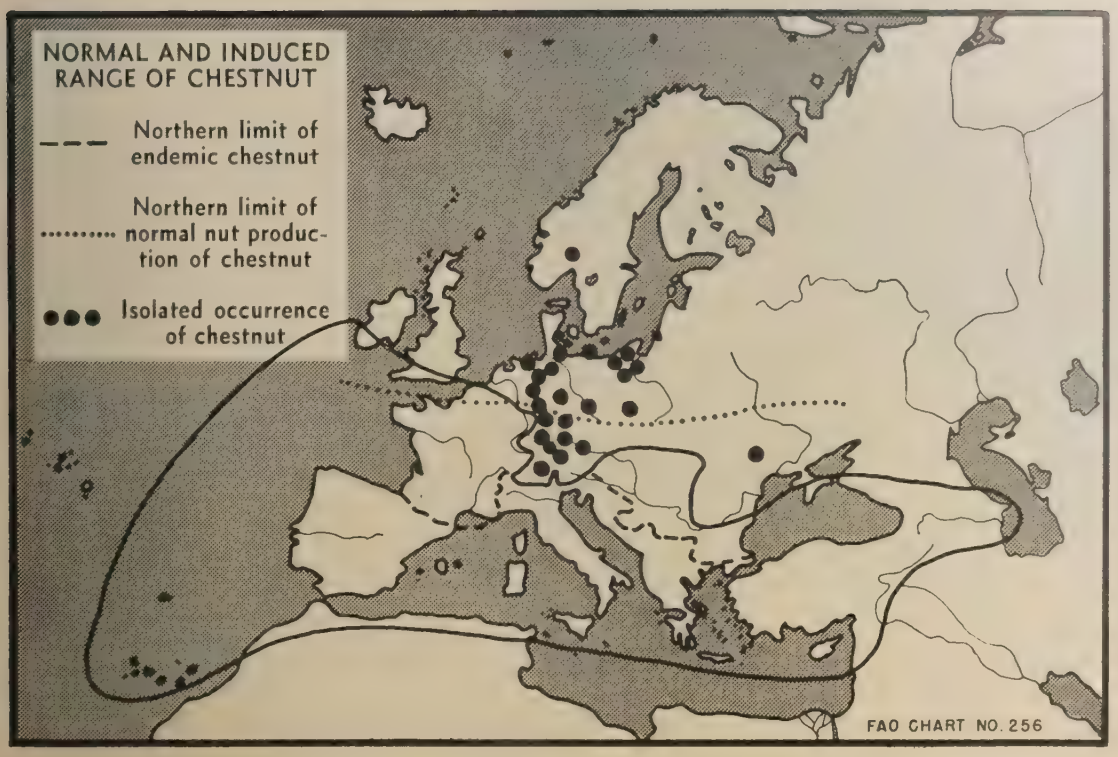
Introduction of Oriental Species of Chestnut

Long before the appearance of *Endothia parasitica* in Italy, as far back as 1919-1920, the Japanese chestnut *Castanea crenata* was introduced into Italy because of its resistance to ink disease. The Silvicultural Experiment Station at Florence, with the co-operation of the Italian Forestry Corps, set up several experimental plantations throughout Italy with varying results. On the whole, the Japanese chestnut, being very sensitive to winds, snow, late frosts, and, above all, to droughts, proved to be more exacting than the indigenous variety — particularly as regards soil fertility, moisture, and climate. The problem of acclimatization of the *Castanea crenata* has not been solved, although in Italy there are certain excellent nut-bearing trees, especially of the Tamba variety. It is agreed that the term "Shiba" is too simple for designating the wild type of Japanese chestnut bearing small nuts, as is the term "Tamba" for the type having larger nuts, since in Japan from 70 to 80 distinct varieties of nut-bearing chestnuts are known. The importance of source, which is particularly significant with respect to acclimatization, is equally so with regard to resistance to *Endothia parasitica* which even in the United States showed variation from case to case. In the groves of *Castanea crenata* existing in areas attacked by the blight it was noted that some of the Tamba and some of the Shiba varieties were attacked in varying degrees and there were also cases of complete immunity, at least up to the present time.

These facts justify continuation of experiments with Japanese chestnut trees in Italy on a larger scale, especially because of the ascertained resistance of the Japanese varieties to the ink disease and their possible resistance to *Endothia parasitica*.

The Chinese species *Castanea mollissima* shows definite proof of resistance. Since this species was not previously introduced into Italy, immediate steps were taken to secure both seed and cuttings for grafting, and in this work support was obtained from American scientists, especially from Dr. Graves and also from Messrs. Gravatt and Clapper of the United States Department of Agriculture who sent this valuable material to Italy. The Italian Study Mission which went to Spain expressly for the purpose of gathering oriental chestnuts secured considerable quantities of *Castanea mollissima* seed, as well as cuttings for grafting, through the courtesy of their Spanish colleagues. Finally, last autumn through the help of Mr. Han Ngan, Director of the National Forestry Research Bureau in Nanking, it was possible to secure 40 pounds of Chinese chestnuts of the two varieties Liang-Shang and Mao-Li. Although the chestnuts were shipped by air, they suffered considerably during the trip. However, they have been planted in the nursery at Masone.

From the province of Bilbao some Korean chestnuts also have been secured. This is quite a distinct type having characteristics between *Castanea crenata* and *Castanea mollissima*. It may even be a variety of the first, though this has not yet been definitely established. It is certain that, as in the United States and Spain, the Korean chestnut is resistant to the blight and is even more vigorous than the Chinese chestnut. The results of the experiments with the Chinese chestnut and the Korean chestnut under the


NORMAL AND INDUCED RANGE OF CHESTNUT
Northern limit of endemic chestnut
Northern limit of normal nut production of chestnut
Isolated occurrence of chestnut
FAO CHART NO. 256

various ecological conditions in Italy are awaited with great interest, especially as it is believed that these two chestnuts have a greater resistance to cold and drought and need less fertile soil than the Japanese chestnut.

Hybridization

The intensive work carried on at present by American scientists in the hybridization of *Castanea dentata* with the resistant oriental species is serving as an example for similar work in Italy and should be followed with perseverance and on a large scale even though the aims differ. The American chestnut is appreciated first of all as a forest tree for its dimensions, the form of its trunk, and the quality of its wood. In these respects the Oriental chestnuts—especially the Chinese species—are much inferior to the American species. Therefore, the purpose of hybridization work in the United States is to produce hybrids which offer the same degree of disease resistance as the Chinese or Korean chestnut, together with the timber qualities of *Castanea dentata*. This task is very difficult because resistance is introduced by the prevalence of the characteristics of the Oriental parents in the hybrids and it is difficult to avoid the concurrence of biological and morphological characteristics. In Italy, the problem is less difficult because the objective is to obtain regular production of nuts of good quality in large quantity from trees adapted to local ecological conditions, rather than any particiular tree form. Since the Chinese and Korean chestnuts appear satisfactory as producers of nuts, it is logical to assume that the prevalence of their characteristics in the hybrids will ensure the desired resistance and, at the same time, a good nut-producing capability. Through the co-operation of Dr. A. H. Graves, a shipment of cuttings from hybrids developed by him was sent to Italy for grafting, and it is thought that other valuable material can be obtained from the United States in future years. For the work of hybridization in Italy, pollen was gathered at first from different varieties of *Castanea crenata* and *Castanea sativa* in the United States and subsequently pollen from American-Oriental hybrids (i.e., with *Castanea mollissima, Castanea crenata, Castanea pumila,* and *Castanea seguinii*) was sent to Italy. Because of the delayed arrival of the pollen, the season was too far advanced for pollination and the results were not very satisfactory. However, in October 1947, a limited number of nuts were obtained which have already been planted. In the spring of 1948, Mr. Gravatt sent pollen from the plantations in Georgia, where blossoming is earlier, in time for securing pollination.

Work in Italy is continuing and it is hoped that a specialized chestnut research center will be established for the purpose.

Photos by courtesy of AVV. Ermanno Biagini, Florence, and Dr. Lucidi.

The Indian Forest Service:

Its Origin and Progress

By R. C. MILWARD

On 15 August 1947, India and Pakistan became independent dominions within the British Commonwealth of nations. Among the established services which concluded their duties and handed over their tasks and their experience to the new regimes, was the Indian Forest Service. Over a period of 90 years, this service had developed an effective program and a body of skilled professional men and leaders. Both were oriented to the tasks of making the forests of India serve the needs of the people, in preserving water supplies, providing saleable products and income, and preserving the fauna. This venture was always difficult and complex, having to contend with established habits of forest exploitation and commercial interests alike. Many aspects of the total problem were successively met, analyzed and measurably solved.

Forestry in India and Burma was a pioneer effort, and served as an indispensable experiment from which subsequent projects in other tropical areas drew experience in approach, method, and doctrine, often put into effect by men who had been seasoned in the heat and difficulties of India's forests. The experience was certainly very useful to other countries as well, as they in turn faced the task of establishing forestry under pioneering or primitive conditions, and in the face of apathy or antagonism. India and Pakistan are better lands, and forestry in many other lands has gained, because of the solid work done by the Indian Forest Service.

THE work of the Indian Forest Service, as embodied in the Indian Forest Department, may be regarded as the second phase in the recorded history of the forests of the sub-continent. A few words about the first phase. Very early in the nineteenth century the British Government became nervous about the supply of teak for the King's Navy. The belt of teak, *Tectona grandis*, near the Malabar coast of western India covers part of the Bombay and Madras Presidencies. The Government there claimed teak as a royal tree, and as early as 1806 introduced some measures for the more conservative exploitation of this and other shipbuilding timbers; but the first real attempt at regeneration of teak was not made until 1842, when the Nilambur plantation was started by Conolly, the Collector of Malabar. Two officers of the long-established Indian Medical Service were the first Conservators of Forests—Dr. Gibson in Bombay in 1847, and Dr. Cleghorn in Madras in 1856. Both were aware of, and had reported on, the increasing devastation of the local forests by over-felling, shifting cultivation and fires, leading, at least in Madras, to the silting-up of creeks and rivers. No adequate action was taken at the time, although good ideas were not lacking.

Meanwhile the other and much larger source of teak, a royal tree in Burma, was opened when Tenasserim was ceded to the British in 1826. There had been trading in this timber before in Moulmein by the British. Dr. Wallich, who was deputed to report on the forests in 1827, found a rich but not inexhaustible supply, but his proposals for their exploitation were not very practical, and timber speculators or licensees were soon reaping a harvest. Natural regeneration of teak is difficult thereabouts and ten years later a great absence of young growth was noted and planting was recommended, but nothing was done for another decade. The province of Pegu was annexed in 1852.

In northern India, the accessible sal, *Shorea robusta*, forests were being very heavily cut for home consumption. For the Dehra Dun district, figures of the annual forest revenue are available from 1815 onwards. The fellings were uncontrolled, the timber being paid for as it left the forest. The peak of the revenue was about the middle of the century. Ribben-

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A forest depot on the bank of a hill stream. Here the cedar railway sleepers are collected, launched into the river and floated down to the depots hundreds of miles away.

trop has recorded that these forests were in a terrible condition when he saw them in 1869-70. In the early 1850's deodar, *Cedrus deodara*, forests were already being exploited for public works in the Punjab, and the fuel shortage at Simla had become acute; on the other hand in Sind enclosures against grazing by camels and goats were enabling valuable species, notably babul, *Acacia arabica*, to regenerate themselves.

Pegu in Burma had rich forests, but they were spared the fate of Tenasserim, for after Dr. McClelland had reported in 1854 in support of the control of exploitation, Lord Dalhouse, the Governor-General, laid down the first outline of a permanent forest policy and Brandis was appointed Superintendent of Forests in Pegu in 1856 and afterwards in Tenasserim. The new Superintendent was responsible for carrying out over a wide area a series of linear enumerations on which he based his scheme of management for a sustained yield. He also introduced some measures of protection and improvement, and for control of timber in transit. Some small regular teak plantations were also commenced at this time. A great struggle with the timber lessees followed over the control of the fellings but, although partial compromise was necessary, the selection of trees to be felled and their girdling were placed in the hands of the Forest Department and have remained there ever since. Meanwhile in Madras too in the years 1856-61, there was much activity, with stress laid on silviculture and the organization of staff for protection in all districts and fuel supplies for important centers. Shifting cultivation was stopped in 1860.

The second phase opened in 1864 when Brandis, who had left Burma two years before, was appointed to be the first inspector-general of forests to the Government of India in order to initiate regular forest administration and management. Forestry had been inaugurated in the western part of what is now the United Provinces under the Commissioners in 1860, and conservatorships followed in the Central Provinces and Oudh in 1861; in the first of these two, shifting cultivation is said to have covered 13,000 km^2 (5,000 square miles). Fire was another very destructive factor, especially in the zones with moderate rainfall.

The Government was the owner of all land, both cultivated and waste, except insofar as it had parted with ownership in whole or part according to the various systems of land tenure. It owned and still owns enormous areas of waste land.

Again, the civil (bureaucratic) administration was based upon the district. The post of each district official, whatever his department and whether superior or subordinate, carried a territorial responsibility. The areas, generally speaking, were large, but no one could absent himself from his area without permission; i.e. without specific leave of absence of one kind or another. Thus no evasion of responsibility was possible. The forest officer was essentially a district officer or became one; at that time there were no specialists.

The head of the district (collector of deputy commissioner) was responsible for the collection of land revenue and the maintenance of law and order. The former centered on the ancient system of land revenue settlements which were revised every thirty

years or so and affected all agricultural interests. These settlements were sacrosanct, and it is easy to realize that when forest administration was started and the forests were carved out and demarcated, and fellings, etc., gradually controlled there was much perturbation and opposition, both high and low, even though (as Baden Powell wrote fifty years ago) the forests were only taken out of the "surplus" waste lands. This opposition died hard and tended not only to retard progress in organization as understood by keen foresters, but also to create a bias against impartial settlements of rights and privileges at the time when the permanent forest settlements came to be made, before individual areas could be notified as "reserved." There were notable exceptions among the higher authorities, men of vision and foresight, but to too many people of all classes the supply of forest produce of all kinds appeared to be unending and any question of economy a fad.

Moreover, in the early 1860's the country had nearly settled down after the tragic events of 1857, cultivation was being rapidly extended, with a concomitant increase of flocks and herds, and there was great activity in the construction of railways and public buildings in northern and central India. Inspection of the Punjab river basins in 1862-3 showed that all good deodar in the lower reaches of the Sutlej within three miles of the river had already been cut. The price of a deodar in some of the petty States was only Rs.2 (4s.) a tree.

If the years between 1864 and 1947 can be divided into periods we may now consider the events of the first twenty to twenty-five years of the Department against the background depicted above. What was the forest staff, how were they recruited and trained, what work did they do?

Apart from Schlich and Ribbentrop, who entered the service in 1866, ninety-five I.F.S. officers were recruited in England, trained in France (Nancy), or Germany, and joined up in the eighteen years between 1869 and 1886. While the first of these were settling down, the hard foundation of organization (selection of State forests, demarcation, surveys, preliminary inquiries about right of user) was being laid by officers recruited locally and partly trained, not least a number of officers of the Indian Staff Corps (Army). Interesting accounts of their experiences by such men as Colonel Pearson, Bagshawe, and McDonnell have been published in the *Indian Forester* and elsewhere. Effective work in primary organization and administration, including protection, was done. Fire protection was begun in the Central Provinces in 1864.

Conservatorships (or Circles) had been created in all the provinces by 1868, but the staffs under them remained very small and the subordinate staff was very badly paid and housed. The area of some of these charges was enormous and, with the firm control from the center and all officers on one list, transfers of the most able officers from one province to another were frequent. Brandis toured India and left many a note of inspection and assessment of timber resources, at the same time collecting material for his great work, *Indian Trees*. Overcut and ruined forests had to be rested and other sources of supply, hitherto inaccessible or less heavily cut, opened up and worked less wastefully. Great numbers of railway sleepers were cut in the decade 1865-75: deodar from the Punjab and Garhwal areas, sal from Oudh and Kumaon, and even chir, *Pinus longifolia*, from the latter. Arising out of the demand for fuel for locomotives and river steamers in the Punjab, the Changa-Manga irrigated plantation was started in the plains near Lahore in 1866-88, but this did not come into full bearing till 1881.

The first Indian Forest Act was passed in 1865. It was soon found to be deficient, especially as regards the regulation of rights. Its successor was Act VII of 1878. In the words of Baden Powell, written fourteen years after about forest settlements, "it was extremely difficult to get the authorities to agree to a complete measure," and, he adds, "all experience shows that, as time goes on, forest property becomes more valuable . . . Such property should become more sharply defined. All rational forest management looks to the future." Himself a member of the Indian Civil Service, Baden Powell spent the middle years of his service seconded to the Forest Department—fortunately for the latter, for he was a great authority on forest law and land revenue systems. Under Act VII what is in effect an elaborate procedure is necessary before a forest can be "reserved," but once completed no more rights can accrue. Where there is doubt about permanency, forests are "protected" and control generally is lighter; damage of many different kinds (fires, etc.) is permissible in protected forests unless specifically prohibited by rules. Among other important chapters are those regarding timber in transit and penalties including the compounding of forest offenses. This Act was brought into force in all the major provinces in India except Madras, for which important modifications were necessary. The separate Act XIX of 1881 was evolved for Burma. Act VII of 1878 has since been superseded by Act XVI of 1927.

Accurate surveys and sufficiently good maps of forests are a *sine qua non* for successful administration and management. In India in the early days of the Department, the Land Revenue staff mapped every field with meticulous care, but only seldom sketched in boundaries of any adjoining forest lands. The Survey of India was busy with more important work than jungles, generally remote. "For several years this want was supplied by provincial and local agency, but it soon became evident that these efforts were not sufficiently controlled . . . the maps varied far too much in character" (Ribbentrop). In 1873, therefore, the Forest Survey Branch was created for topographical surveys, to work with the Survey of India but directly under the inspector-general of forests. Later the Survey of India employed parties in several provinces, with the result that in the twenty-five years up to 1898 more than 120,000 km^2 (46,000 sq. mi.) of government forest had been surveyed and mapped, mostly on the scale of 1 to 16,000 (4 in. to the mi.). By 1907, 177,770 km^2 (68,637 sq. mi.) had been surveyed and mapped.

The name of Col. Bailey of the Royal Engineers is connected with the beginning of the Forest Survey Branch, as it is also with the first years of the Forest School at Dehra Dun. This was opened in 1878 in supersession of the earlier training at the Rurki Engineering College, where little forestry could be taught. From the start the aim at Dehra was to turn out practical foresters. On the whole this has been done very successfully and the school has furnished those Pro-

Every slope that is not too steep is terraced and cultivated. The rest is heavily grazed and landslips occur owing to denudation.

vincial Governments by whom it was supported with a succession of valuable members of the upper subordinate service, some of whom gained promotion to the I.F.S. Moreover, the classes have acted as a melting pot for the students of diverse races. The provinces have given generously of their officers to staff the school. The number of rangers who graduated in the first seventeen classes was 344 and of foresters (lower standard) 101. The director of the school was also the Conservator of the School Circle of three forest divisions which formed a fine training ground between November and June each year. Perhaps the best known among the directors was Gamble, botanist and author of the *Manual of Indian Timbers.*

Closely connected with the school was the departmental but unofficial monthly magazine the *Indian Forester,* which first saw the light in 1875 with Schlich as its first editor. Produced under the pressure of other work, this publication has both brought out articles of scientific and historical value and also maintained a freshness of outlook and expressed contemporary opinion in a way which might not otherwise have been possible under a bureaucratic regime.

The assessment of timber resources by valuation surveys was not confined to Burma. In the early 1860's they were carried into northern India also, as a counter to overfelling. As the organization of the better forests began to take shape, and in spite of, or perhaps because of the paucity of the staff, it became clear that the work to be done each year should be planned in advance (this is easily done in India, where the monsoon rains retard or stop outdoor work from July to September or October). When Schlich was transferred to Sind in 1870 it was partly that he might draw up a regular plan of operations. The situation there was easy; the forests were well demarcated and with no possibility of rights being claimed, but the demand for timber and fuel was keen. These plans of operations, generally annual and subject to a check on each item at the close of the year, became the order of the day. They led on to the much more elaborate working plans, as more professionally trained officers became available and the collection of data more systematic, chiefly at first in the United Provinces (then the North West Provinces), Burma and the Punjab. But even in 1884, although a lot of other preliminary work had been done, only 280 km^2 (109 sq. mi.) of reserves were listed as being under such plans in the Bengal Presidency; i.e., the whole of British India other than Madras and Bombay. Oliver's carefully thought-out plan (1885) for 259 km^2 (100 sq. mi.) of Prome was the first plan in Burma.

Working plans were helped by the fact that owing to a measure of decentralization in 1882 the local governments obtained a direct interest in surplus revenues from the forests, and officers who made such surpluses were commended; in fact forests were expected to pay their way. It is said that in the valu-

able forests of Oudh the possible annual yield was forestalled for many years. Therefore, Schlich, who had just become inspector-general, proposed to centralize the control of the preparation of regular working plans and of future management under them, in the Governor of India; i.e., the inspector-general, with a special branch under a superintendent of working plans. This important proposal was sanctioned in 1884.

Thus, during this first period up to, say, 1886, and in spite of difficulties and a very small staff, the foundation of the forest organization was truly laid. The next twenty years, during many of which Ribbentrop was the head of the Department, were years of progressive consolidation and coincided with the arrival of the I.F.S. men trained at Cooper's Hill in the United Kingdom by Schlich and Fisher and other able teachers. The Cooper's Hill motto was *mens sana in corpore sano;* this fitted quite well the 162 foresters who went to India between 1887 and 1906, as well as their fellow engineers who were joining the Public Works Department. The Cooper's Hill foresters who received part of their training in German and French forests were to serve under their elders trained wholly in France or Germany, or, quite often, under the diminishing band of officers (Indian Staff Corps, etc.) who were only partially trained in forestry, but generally knew the country, language, and customs well and were the less likely to fall victim to the wiles of contractors and others.

Here a few words may be said about the Provincial Forest Service (P.F.S.), which was inaugurated in 1891 and occupied a position between the I.F.S. and the upper subordinate staff. The first P.F.S. men were trained in the Rangers' School at Dehra Dun and took the place of the old sub-assistant conservators. They were second-class gazetted officers and were often in charge of minor forest divisions. A special class was opened for their training in 1912 and then higher qualifications for entrance were demanded.

Very little of a spectacular nature happened during these years, but a steadily increasing area of reserves was being created, administered and restored and forest settlements rounded off. By the year 1906-07, 241,200 km² (93,138 sq. mi.) had been "reserved," of which 56,000 km² (21,575 sq. mi.) were in Burma, and 24,500 km² (9,468 sq. mi.) "protected" under the Forest Acts. Of the boundaries of these forests one-ninth were natural and the remainder, 230,500 km² (143,256 miles) artificial, all to be kept in order in a variety of climates and types of forest.

Fire protection was in full swing, 115,100 km² (44,443 sq. mi.) being under protection in 1907. Despite the obvious benefits to the growing stock arising from it in the coniferous and deciduous forests of moderate rainfall, doubts were already (about 1905) being thrown upon its advisability in the wetter forests of Bengal and Burma with the insidious ousting of the more valuable deciduous by evergreen species.

The rehabilitation of the ruined forest took a long time and could not be hastened. Improvement fellings with cleanings were the rule, or coppice with standards where the villagers' demands for small timber required them. Selection fellings or selection with improvement were possible in some areas of big timber and the shelter-wood compartment method was introduced successfully in one or two forests of *Pinus longifolia*. All trees were hammer marked before sale or felling. Periodical creeper-cutting was also necessary. The renewal of crops was almost entirely by unaided regeneration, the principal exception being the teak *taungya* plantations in Burma, of which there were some 28,594 ha. (70,655 acres) in 1907. Plantations for the supply of fuel were formed with eucalypt and *Casuarina* in Madras and with *Dalbergia sissu* in the Punjab plains. The preparation of working plans was steadily pressed on and by 1907 a total area of 110,000 km² (42,468 sq. mi.) of the best forests had been put under them.

With increasing continuity of treatment and the general development of the country the forest revenues rose, though a disproportionate amount came from Burma. The expenditure was kept in ratio. Communications (forest roads) and buildings were backward on the whole. At the end of the period all ranks were receiving better rates of pay and allowances.

In most of the provinces the relations between the revenue and forest officials improved considerably, but in more than one of those in the Indian Peninsula, especially where the forests are an important source of grazing and small produce for the villages, the reserves were divided into two classes, first and second. As the condition of the village waste lands deteriorated, the pressure on the improving Government forests tended to increase in spite of closures to grazing. This has gone on ever since and has indeed become one of the most difficult problems of the Indian forest administration.

Already in 1883 on account of the periodic occurrence of famines, fuel and fodder reserves had been mooted in connection with the protection of cattle in seasons of drought, and under the prevailing circumstances there was little cause for surprise when the Government of India issued a circular in 1894 ordering the reclassification of all its forests into four principal groups, of which the lowest was pasture forests. From the forest point of view it seemed a retrograde step, considering what a small proportion of the waste lands (roughly one quarter) had been constituted Government forests. There was a lot of truth in the words of Baden Powell: "Above all do not let the mischievous notion gain ground that only high-class timber forests need restrictions, regeneration and care, and that the humbler classes need none." He also wrote very strongly against any policy of drift.

Progress in Burma is implied in the opening of the Burma Forest School in 1898. The conception of the Forest Research Institute at Dehra Dun belongs to this period and the credit for it goes to Eardley-Wilmot, who had succeeded H. C. Hill and Wroughton as inspector-general in 1903. The Institute came into being in 1906 and is dealt with more fully in the next period. Similarly with the chief conservatorships, which were created in provinces having more than two conservators so as to co-ordinate the administration and to take the control of working plans, now become very numerous, out of the hands of the inspector-general. The first chief conservator was appointed for Burma in 1905.

When the Cooper's Hill College was closed in 1905, the home training of men for the I.F.S. was transferred to Oxford University under Schlich. The Sec-

retary of State subsequently accepted trainees from other universities, so that, apart from the eleven men who moved with Schlich to Oxford and came out to India in 1907, the following numbers joined the service in the twenty-five years 1908 to 1932: 203 from Oxford, 54 from Cambridge, 39 from Edinburgh, together with 14 from Dehra Dun—in all 310. As there was no significant European recruitment between 1933 and 1947, these numbers cover the whole 40-year period 1908 to 1947; this will now be dealt with. It may be added that the European tours continued to be an important feature of the training.

The period was one of general advance, and, particularly during the last half of it, there was an enlargement in the scope of the Department and even an overflow beyond its former limits to soil conservation and utilization. At the close there had come a better appreciation by responsible people of the value of forests and forestry in the economic life of India as an aid to agriculture and the rural administration, where it touched the latter, as well as for the timber industry. There could no longer be any doubt that the forests could be restored and conserved and, at the same time furnish a continuous supply of produce of many kinds and revenue; also there had been two world wars, to the winning of which the forests made a big contribution, albeit at the expense of the crops built up over many years. The Forest Research Institute had been developed greatly and proved its worth not only on the silvicultural [illegible] but, more obviously to the outside public, [illegible] sphere of utilization (consumption). The [illegible] growth in the population and the rise in the cost of living increased the value of the rights and concessions for free or cheap produce from the forests to the villages entitled to them.

Foresters in India were naturally interested in the betterment of land, as a whole, because they had so much poor land in their charge, the productivity of which they were constantly trying to improve. They tended to view land from the worst upwards, others from the best downwards. To a forester a landslip is not just an act of God, but due to someone's carelessness, maybe to excessive grazing; anyhow it is something to be remedied. For a variety of reasons attention has recently been focussed on the misuse of land on the outer slopes of the Himalayas in the Punjab, but good work has also been done in the way of land development, outside the boundaries of Government forests, in the United Provinces and Bombay. Lessons have been learnt from the United States of America. It is worth remembering that a hundred years ago Dr. Gibson was inquiring in Bombay about the effect of denudation of the forests on the climate of different localities and upon water supplies.

A few statistics of 1939-1940 may be given to illustrate the size of the Department's activities, remembering that Burma was separated from India in 1937:

Making charcoal in remote forests. The natural forest is felled and made into charcoal and the site is then planted with more valuable species.

AREAS: *India* 188,500 km² (72,793 sq mi) reserved forests, 17,350 km² (6,699 sq mi) protected, 49,800 km² (19,229 sq mi) unclassed.

Burma 81,940 km² (31,637 sq mi) reserved forests, nil protected, 245,200 km² (94,655 sq mi) unclassed.

FINANCE: *India* Revenue, Rs.302 lakhs (£2,270,000); expenditure, Rs.227 lakhs (£1,700,000).

Burma Revenue, Rs.144 lakhs (£1,080,000); expenditure, Rs.84 lakhs (£630,000).

WORKING PLANS: *India* 172,000 km² (66,403 sq mi) under sanctioned plans.

Burma 75,200 km² (29,034 sq mi) under sanctioned plans.

PROTECTION FROM FIRE: *India* area attempted, 125,900 km² (48,615 sq mi).

The inspectors-general of this period who followed Eardley-Wilmot were Beadon-Bryant, Hart, Clutterbuck, Rodger, Blascheck, Trevor, Howard and Hamilton.

The interest of those local governments which had large or valuable forest estates was stimulated when, in 1911, the revenues and expenditures of the forests were made wholly provincial. Be this as it may, the number of conservators was increased largely about this time—even working plan circles making their bow as well as utilization officers—and so for the six bigger provinces, Burma, Central Provinces, Bombay, United Provinces, Madras and the Punjab, in the order given, chief conservators' posts were created between 1905 and 1921.

As regards administration, grazing had given the territorial officers in the provinces of moderate rainfall much to think about and had been the subject of many articles in the *Indian Forester*. The areas had been too large and the staff too small to enable a system of control to be introduced which would be fair alike to the forests and the graziers, but grazing settlements for forests under severe pressure (in the Central Provinces), as an essential part of individual working plans, have stood the test of time. At high levels in the north-west Himalayas, both in Government and States' forests, the grazing, with lopping, of nomadic flocks of sheep and goats, and in a lesser degree buffaloes, has been extremely destructive to the important protective belt of oaks and high-level birch in the last forty years. Oaks of the upper zones have also suffered much from indiscriminate lopping by villagers. The conservation of soil and water is very greatly endangered by these practices, when carried to such excess.

Complete fire protection went out of fashion. In inflammable and grassy forests where the valuable species are at all resistant to fire and when regeneration can be concentrated, "early burning" seems the best way out of trouble at present. It is useful in forests of chir, *Pinus longofolia*, if carefully applied. Again, fire protection in climates and under conditions favoring the development of evergreen at the expense of more valuable species has been proved wrong.

These matters are obviously tied up with the silviculture of the different species—the gregarious sal and chir and the more sporadic deodar and teak, the principal timber species—and help to make it such a fascinating subject in India. With it goes that part of management which deals with the methods of treatment and the working plans built upon them. A great deal of excellent work has been done during this period for many of the provinces, with the silviculturist at the Forest Research Institute controlling from the centre and the provincial silviculturists aiding and abetting. Owing to the improvement of the crops it has been possible to introduce more up-to-date or profitable methods without departing from sound principles. The uniform or shelter-wood compartment method has been extended to the better sal forests and to some deodar. Where clear-fellings could be made in some areas to afforested, the *taungya* method of regeneration has been employed successfully in several provinces; an earlier generation might have fought shy of anything connected with shifting cultivation. Under other methods more use has been made of planting to aid natural regeneration, particularly since stump-planting was developed. As to regular plantations, during the period 1894-1924 the Punjab Forest Department lost 2600 km² (1000 sq mi) of plains forest to the Canal Department and replaced them more or less with seven irrigated plantations (apart from Changa Manga) of 18,600 ha (46,000 acres). The famous old teak plantation of Nilambur, started in 1842, began its second rotation in 1917. Much remains to be done in regard to mixtures in plantations, especially in humid climates; pure plantations of species not found pure in the natural forest appear very subject to insect attacks.

Working plans which need revision after short periods are not easy to keep up to date; a ten-year period is too short for practical administration. In the larger provinces a special working-plan staff has been found essential and a working plan circle very useful. Within five or six years of the constitution of a working plan circle in Burma, a big deficit of working plan preparation was quickly cleared.

The disposal of produce, both major and minor, has been done mainly through contractors by auction or tender. Departmental working has been necessary at times, generally through contractors working under the divisional forest officer. In Burma, where private teak firms were very powerful, an important area of teak in the Pegu Yoma has been operated by departmental agency from very early days.

The Forest Department in India owed its origin partly to the needs of the railways for timber and firewood, and it can be said that it was they, acting with or through the utilization branch of the Forest Research Institute, who bent the surplus energies of the administrators into taking a more direct part in the utilization side of timber. The silviculturists, too, for the benefit of the mixed forests, were anxious to see other timbers marketed on a fuller scale than the half-dozen or even dozen which the traders were ready to extract. There were other reasons, too, e.g., there seemed a lot of money to be made! And so for various reasons utilization officers, and even a few utilization circles, came into being in several provinces and did most useful work, especially in war-time, but more grandiose schemes about 1920 mostly failed where they involved large expenditures and touched on what may be called the intricacies of private enterprise.

The recruitment of a new branch, the Indian Forest Engineers, eighteen of whom joined up in 1921 and

Reclaiming the desert. The scrub is cleared and the land roughly levelled. It is then flooded with irrigation water to wash out the slats and it is sown with babul, Acacia arabica, *which in twelve years sweetens the land and produces a fine crop of fuel and small timber. Cotton is grown for a few years in between the babul lines as a catch crop.*

Reclaiming the desert. Three years ago this was the same as the scene above. Now it has a fine crop of babul, Acacia arabica, *and cotton. The cotton crop pays for this reclamation of a salty sandy waste.*

1922, was in a rather different category. They were brought from Britain to give expert engineering help on the territorial side, anything to do with improving and cheapening the harvesting and conversion, including roads and buildings, as well as portable sawmills. There were able men among them and they certainly filled a gap.

The activities of the Forest Research Institute at Dehra Dun have been briefly referred to already. Since its inception the Institute has been greatly enlarged under two of its presidents, Mercer and Perree, and each of its branches, silviculture, botany, entomology, chemistry and utilization, has added much to the knowledge and development of Indian forestry and forests. A fine set of buildings and workshops inspires to effort and makes Dehra a worthy center for conferences on professional matters. It is quite impossible here even to summarize the work of the Institute. Personal visits by the heads of branches and their assistants to all parts of the country and the issue of records or papers of a permanent or temporary nature are its principal features. It may be said, without disparagement to the work of other branches, that the utilization section did very valuable work during the two wars, in particular the second, when the use of secondary timbers and economy in the employment of wood and other forest produce became a vital necessity. Many years of systematic research had made this possible.

The pioneer workers at the Institute included Troup (silviculture), Hole (botany), Stebbing (entomology) and R. S. Pearson (utilization). Later workers of note include H. G. Champion (silviculture), Beeson (entomology), and Krishna (chemistry). Forest education also had its headquarters at Dehra Dun. The rangers' school in the fifty-nine years up to 1939 (later figures are wanting) graduated 1322 rangers and 286 foresters to the provinces and Indian States, a great majority to the former. There was a P. F. S. class there from 1912 to 1928 and an I. F. S. class was started in 1938, but shut down during the war. In 1912 Madras opened its own rangers' school for students from Southern India at Coimbatore; this ran for many years. In Burma the rangers' school at Pyinmana has already been noticed; a P. F. S. class was also opened at Rangoon University in 1923. Several provinces also ran their own well-managed classes for foresters for many years. In short, it has been a fixed policy to train the upper subordinates proportionately as highly as the superior officers.

A word about forestry in the Indian States. Before the advent of the Indian Forest Department several States in southern India were important sources of forest products: sandalwood in Mysore, teak in Travancore and Cochin. The first British conservator in Mysore was appointed in 1864 while the State was under British management. Before 1867 Cleghorn had drawn up a set of simple rules of conservation for the guidance of state councils. In the north the Jammu and Kashmir State has very valuable deodar forests and for many years an officer was seconded from the I. F. S., as conservator, to supervise the management. Other States rich in deodar are or were Tehri-Garhwal, Bashahr and Chamba. In recent years forty-two Orissa States have been banded together for forest management under an Adviser; sal is the principal species. At one time or another fifty-five States have sent their men to be trained at the Dehra Dun school or college.

The transfer of the administration from British to Indian hands has been made gradually over a period of years—from the time of the Reform Act of 1919 and of the Lee Commission in 1923.

Finally, honorable mention should be made of some of those who left the Indian Service to organize forest departments in other parts of the British Commonwealth. Such were Hutchins and Storr Lister in South Africa, "Timber" Thompson in Nigeria, Burn-Murdoch and Cubitt in Malaya.

* * *

In order to illustrate the more recent position and wider scope for forestry, mention should be made of the recommendations for postwar forestry policy sent in 1944 by the Inspector-General to the Reconstruction Committee appointed by the Government of India. They cover the whole Indian canvas with a broad brush, including private forests and those of the Indian States, and carry forward the principles laid down by the Central Government in the circular of 1894 already referred to, which, however, only dealt with government forest and Crown waste land. Taking India as a whole, and the large areas of the plains (covered with villages) which are watered by the Ganges and Indus and their tributaries and are for the most part far distant from any constituted forests, it is pointed out that the most important problems are, firstly, proper land management to control floods and erosion, and the afforestation of the dry belt in the west (Rajputana, etc.) and, secondly, the provision of small timber and firewood sufficiently close to their homes for the ordinary agricultural village consumers, both to provide for their direct wants and to release cowdung for manure.

In the main the recommendations were accepted by the Committee, as indeed all well-wishers for the prosperity of the country would desire, but their adequate fulfilment will require a great deal of money, staff, and time. That need not be a deterrent.

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All photographs by courtesy of the Forest Research Institute, Dehra Dun, India.

Commodity Reports

Softwood Lumber Notes

THE data available at the time of writing indicate that in most countries production of softwood lumber during the first nine months of 1948 was running equal to or slightly higher than for the corresponding period of 1947.

In most countries the general level of business activity showed an increase over that of the previous year. However, high prices tended to limit effective demand for lumber, bringing demand in closer relationship to the available supplies. Countries which depend upon imports for a great deal of their supplies of softwood lumber have limited demand by exercising import or currency controls. Demand has also been limited by other controls such as rationing and controls over credit, although actual needs continue to be great.

Very many statements have been made that selling prices do not cover the costs of production. On the other hand consumers of lumber in all countries feel that prices are high. This has led to the use of lumber conserving methods in industry and an intensification of the search for substitute building materials. In North America prices of most grades of lumber appear to have reached their peak, barring unforeseen increases in the general cost of living. This may also be true in Europe.

NORTH AMERICA

United States of America

According to the United States Department of Commerce, it now seems doubtful whether total 1948 lumber production will have reached 19.2 million standards, as earlier anticipated, although it seems clear that production was sufficient to satisfy current demand.

While the third quarter of 1948 was outstanding for its over-all lumber production volume, it is believed that in the fourth quarter there was a curtailment of, or withdrawal from production of a substantial number of marginal operations in both the West and the South as a result of significant declines in prices for rough green lumber. This tendency may have started earlier in the year, as the increasing total availability of lumber and stronger resistance to high prices for poorly manufactured products, accompanied by continued high levels of stumpage prices, made it difficult for the highest cost operators to continue profitable operations.

The total supply of lumber for the third quarter of 1948 exceeded 10.9 million standards, of which beginning stocks accounted for 5.4 million, production for 5.2 million, and imports 0.3 million. The aggregate supply of lumber has at last caught up with the current effective demand, indicated not only by the generally softening prices which characterized the latter part of 1948, but also by the relationship between production, orders, and stocks. Unfilled orders have shown a strong declining trend and increased proportions of current production have gone into inventory accumulations at the mill level. Retail stocks apparently reflect a strong inclination on the part of retailers to avoid further expansion of stocks.

Softwood Lumber Production

Figures collected by the National Lumber Manufacturers' Association indicate that softwood lumber production in the United States for the first nine months of 1948 was 10.80 million standards or slightly in excess of the 10.77 million standards estimated for the previous year. During the period, output in the Southern Pine region totaled 3.64 million standards (3.94), 3 million in the West Coast region (2.86), 2.75 million in the Western Pine region (2.60) and 1.41 million standards in other regions (1.37). Data in parentheses are for the corresponding months of 1947.

Stocks

At the end of January 1948 stocks of softwood lumber were estimated by the trade to be approximately 1.82 million standards. At the end of the first quarter the volume fell to 1.80 million standards. Thereafter stocks increased and at the end of the second quarter totaled 2.01 million standards; the increase continued to the end of the third quarter when stocks reached 2.32 million standards. This expansion in stocks enabled lumber yards, for the first time in many years, to obtain nearly balanced inventories to meet the requirements of their customers.

Retail lumber dealers are reported as desiring not to increase stock levels further until price and demand uncertainties become more clear. The high capital investment required contributed to their decision to await further developments. While figures are not available, it is said that the increase in stock levels has been disproportionately high in the lower grades, supplies in the upper grades in general being still subnormal.

Consumption

Total new construction activity in 1948 reached almost $18,000 million, a record in terms of value and an increase of 26 percent over the previous high figure

for 1947. However, the physical volume of construction does not seem to have exceeded the peak levels reached in the nineteen twenties nor the level attained in 1942. Residential construction was the largest single component of new construction and amounted to 40 percent of the total.

In 1947 the amount of completed construction was held down by the lack of balanced supplies of all types of building materials. The supply situation for most building materials improved in 1948 and this materially assisted construction.

The U. S. Department of Commerce reports that for 1949 it is expected that the supply of building materials will continue the improvement shown in 1948. Basic construction items such as lumber, brick, concrete blocks, asphalt roofing and building boards will be in ample supply. No shortages of lath and gypsum board are anticipated.

Because the number of residential buildings started has dropped, it is expected that the number of completed buildings during 1949 will be smaller than for 1948.

U. S. Wholesale Domestic Price Indices

(1939=100)

Item	1948				
	Jan.	April	June	Sept.	Nov.
All Douglas fir lumber	359	367	391	390	386
All Southern pine lumber	361	356	341	339	331
All Western pine lumber	305	314	333	355	348
All lumber	330	332	336	340	333
All other building materials	214	216	218	225	224

Source: U. S. Department of Commerce, Office of Domestic Commerce *Lumber Industry Report* (Washington, D. C.).

Prices

The level of all lumber prices appears to be higher than the relative level of prices for all other building materials. On the whole, during the first nine months of the year prices rose steadily although a leveling-off tendency appeared evident in July and August and declines were small, but definite in September. Indices of wholesale lumber prices declined definitely during October and November, although this may not have been true of all items.

Trade

Exports of softwood lumber (exclusive of boxboards) during the first nine months of 1948 were 190 thousand standards, considerably below the 382 thousand standards exported during the same period of 1947. Of the total 1948 Jan.-Sept. exports, Douglas fir accounted for 139 thousand standards, southern pine 37 thousand, ponderosa pine, sugar pine, and white pine 7 thousand standards, hemlock, redwood, cedar, cypress and spruce together 5 thousand standards, and other softwood 0.5 thousand standards.

The 1948 export trade is said to have been clearly subnormal. High prices and dollar shortages may have substantially contributed to the low level. In some parts of the softwood lumber industry, the present level of exports is causing a production problem.

Whereas U. S. softwood lumber exports decreased over the first nine months of 1948, lumber imports at 647 thousand standards stood far higher than the corresponding 1947 figures of 360 thousand standards. The chief species imported were spruce 302 thousand standards, fir and hemlock 174 thousand standards, and pine 123 thousand standards. Other grades accounted for 47 thousand standards.

Softwood lumber accounted for 84 percent of all lumber exports, and for 89 percent of all lumber imports during this period.

Of the total softwood lumber exports during January-September 1948, those directed to Latin America accounted for 29 percent, to Europe 27 percent, to Africa 18 percent, to North America 5 percent, and to all other destinations 21 percent. The distribution of softwood exports for the full year of 1947 was as follows: Latin America 23 percent; Europe 39 percent; Africa 8 percent; North America 7 percent; other destinations 23 percent.

Exports to the nine countries indicated below accounted for 78 percent of the total exports during the first nine months of 1948.

Destination	*1000 stds.*	*Destination*	*1000 stds.*
United Kingdom	45.5	China	8.8
Union of S. Africa	26.8	Canada	8.2
Cuba	15.5	Peru	7.4
Australia	15.5	Mozambique	6.9
Argentina	12.6		

Canada

Production

The softwood lumber output of 2,019,000 standards during the first nine months of 1948 was 36,000 standards higher than the corresponding figure of 1,983,000 standards for 1947.

The lumber industry in British Columbia is the source of nearly one-half of the total Canadian output. In this province 93 percent of the softwood production consisted of Douglas fir, hemlock, red cedar and spruce. Total production of softwoods at the end of September was running almost 3 percent higher than in 1947.

In the other eight provinces of Canada reports from the larger mills indicate that 65 percent of the softwood lumber produced was made from spruce and balsam fir, 15 percent from white pine, and 11 percent from Jack pine.

Stocks

At the end of March stocks in the hands of manufacturers totaled 372,000 standards, or approximately the level of 1947 for the same date. At the end of June stocks rose to 399,000 standards, a figure 39,000 standards greater than the year before. At the end of September stocks rose to 458,000 standards which was 20,000 standards greater than the previous year's figure.

Trade

Exports of softwood lumber for the first three quarters of 1948 total 902,000 standards, a decrease of

8,000 standards as compared with the same period in 1947.

The shift in the destination of exports is of considerable interest. For the nine month period, exports to the U. S. A. rose from 308,000 standards to 580,000 standards. This increase was offset by the decrease in exports to other destinations as shown below.

Destination	Exports Jan.-Sept. 1948	1947	Increase Decrease
	(Thousand standards)		
U. S. A.	580	308	+272
United Kingdom	219	363	—144
Union of South Africa	36	43	[illegible]
Netherlands	5	42	— 37
Australia	18	42	— 24
Argentina	2	4	— 2

EUROPE

Towards the end of 1948 it seemed that effective demand for softwood lumber had been more or less brought into line with available supplies.

Through 1948, the European economic position, and in particular the timber situation, was influenced by two significant factors—

1. The measures taken in various countries to prevent a further rise in prices, and against the inflationary tendencies which became increasingly apparent in 1947.
2. The lack of foreign exchange, particularly dollars, for international trade.

Measures against inflation were not applied simultaneously in the various countries and their effects varied, therefore, according to the nature of the economic situation at the time of application. This uneven development led to considerable price difficulties in the timber trade. Discrepancies in price movements were further increased by the fact that full employment and higher wages in other manufacturing industries exercised a strong drawing power for forest and timber workers in important production areas. Timber industries were forced to adjust wages for lumbering and transport work toward the levels obtained elsewhere, thus increasing production costs.

In some countries efforts to combat inflationary tendencies, through the limitation of credits and rent control led to a fairly considerable decline in investment. In Italy, Belgium, and to some extent in France, this resulted in a big reduction in building activity, and therefore also in the demand for timber, a tendency which was strengthened by the reduced demand on the part of industry. In Europe all payments between countries are made through a payment agreements system, i.e., mainly through bilateral clearing arrangements. It is in the nature of such settlements that export and import values must be balanced against each other. The establishment of this equilibrium often meets with great difficulties. As a result, timber imports have either to be reduced or paid for in hard convertible currency. Until recently various countries were drawing to a large extent on currency reserves for essential timber imports. Many countries have now covered their most urgent reconstruction needs in respect to timber, and they need to budget their currency reserves more stringently. Consequently, fewer dollars, or hard convertible currency, are being made available for the purchase of timber. The covering of clearing balances which may arise from timber imports thus becomes increasingly difficult.

There is a parallel tendency to limit purchases in the dollar countries themselves, Canada and the U. S. A., as far as possible.

The interests of European importing and exporting countries in the matter of prices resulting from this position are exactly opposite. For importing countries every increase in timber prices means a reduction in the volume of timber or of other important products imported; while for timber exporting countries any decrease in prices means a proportionate reduction in other imports.

Stocks continue to be at relatively low levels. The collapse of prices which has occurred at various times in exporting countries, and to a large extent in the retail trade in importing countries, e.g. Italy, is a warning to importers and holders of stocks that they must adopt a cautious attitude.

Considerable progress has been made in the last few years in the economical use of timber as a building and construction material. As a result of this technical progress, timber consumption may continue lower compared with pre-war even after the present period of acute shortage is over.

EXPORTING COUNTRIES

Austria

IN 1947 timber, in the form of both round wood and sawn wood, was widely regarded as a capital investment, and accordingly stored and held in large amounts. After the currency reform had become effective, all branches of production and trade attempted to realize on their stocks, as a means of increasing their liquid assets. Hence in 1948 demand, which remained at about the same level as in the previous year, was confronted with an increased supply, with the result that prices paid in the internal market, in the case of low grade lumber, actually dropped below the prescribed maximum prices, to between 30 and 50 percent of the amounts paid in the previous year.

Requirements in respect to grades have become more exacting. Thus, unlike 1947, the 1948 timber market in Austria was in a state of equilibrium. In view of this, there has been an appreciable relaxation of controls.

Production

Although an improvement is to be noted, production has continued to meet with great difficulties. These were chiefly connected with the haulage of round wood from the forest to the open road, and

from there to the saw mills. The feeding of forestry workers and supplies of fodder for horses improved considerably, but the scarcity of forestry and transport workers had not yet been overcome. The position was improving from month to month, so that it is hoped to carry out the full permitted cut in the winter of 1948/49. However, in order to make up for the overcutting before and during the war, this winter's fellings have been reduced by 24 percent.

When estimating future timber availabilities the considerably improved supply position of Austria in respect to coal and liquid fuel should be noted. It is well known that from the 1946/47 and 1947/48 fellings, large amounts of wood suitable for industrial uses and paper-making had to be used as fuel. Reduced consumption of wood for fuel will have a favorable effect on supplies of industrial timber and pulpwood.

Trade

The countries which constitute the main markets for Austrian timber are Italy, Switzerland, the Netherlands, Hungary and Greece. In general, the export trade in 1948 had to contend with bringing timber grades up to the higher standards required by foreign countries, and with competitive prices. In spite of these obstacles, Austria was able to export some 308,000 m^3 (s) between January and September 1948, as compared with 112,000 m^3 (s) in the corresponding period of the previous year.

Czechoslovakia

Production

The fellings of 1947/48 winter were heavily hampered by the lack of snow, which did not permit transport to the sawmills in time. This plus the shortage of labor in the forests made it impossible to reach the felling targets set for 1948.

Production of the sawmills, however, exceeded planned production by 17 percent. This was made possible by drawing on stocks of logs, which have consequently been greatly decreased.

Trade

Final export figures for 1948 are expected to be much lower than those of 1947, when a total of 125,000 standards was exported.

During the first six months of 1948 only 38,300 standards were exported, the principal destinations being:

Netherlands	15,400	standards
France	7,900	"
Hungary	2,600	"
Italy	7,200	"

Smaller quantities were sold to Belgium, Denmark, Greece, Poland, Switzerland, United Kingdom and the Near East and North Africa.

The considerable decrease in the export figures for the first half of 1948 against the 1947 figures has been explained partly because the prices for Czechoslovakian timber are considered to be rather high compared with its quality, and partly because of a slight increase in Czechoslovakia's home consumption.

Finland

Production

Lumber production, which has been steadily increasing, was expected in 1948 to reach levels 10 percent above 1947. As production approached the prewar level, the more difficult it has been to increase it, owing to the lack of power, replacement parts, new equipment, and manpower. Stocks of logs were generally adequate. However, during the next few years the permissible cut in the forests will not be sufficient to elevate economic activity to normal without resorting to over-cutting of accessible forests. This is due to the exceptionally great need of fuelwood and partly to the increased local consumption of timber during years. Overcutting is expected gradually to decrease, chiefly owing to increased coal imports, and the extension of fellings to unexploited forest areas.

Trade

Total timber exports during the first three quarters of 1948 amounted to 60 percent of the 1935 level. At the end of September 1948 total exports of sawn timber amounted to 315,200 standards, showing an increase of about 20,000 standards compared with the same period in 1947.

The principal destinations were:

	Jan-Sept 1948	*Jan-Sept 1947*
Belgium	20,100 stds	15,200 stds
Denmark	43,000 "	27,400 "
Netherlands	21,000 "	7,700 "
United Kingdom	109,800 "	126,900 "
U.S.S.R.	78,300 "	68,900 "

Besides sawn timber, Finland exported during the first three quarters of 1948, 208,000 m^3 (r) of softwood sawlogs as compared with 121,000 m^3 (r) for the same period in the previous year.

The future prospects of timber exports have been considerably affected by the sudden reduction by 50 percent of Finland's war indemnities to Russia. As these indemnities covered principally finished products, it can be expected that larger quantities should be available for export during the next season.

Prices

The great problem in the Finnish export trade in 1948 was the question of prices, which like prices elsewhere have been rising due to increased cost of logs, wages, and transport. As buyers have become more and more unwilling to pay higher prices, foreign sales have been more difficult, and sawmills have been obliged to restrict production. The price development of Finnish timber, e.g. for the British market, has been as follows:

1939	£11. 5s. 0d.	1943	£25. 5s. 0d.	1946	£28. 10s. 0d.
1940	£19. 2s. 6d.	1944	£27. 5s. 0d.	1947	£39. 0s. 0d.
1942	£21. 2s. 6d.	1945	£23. 0s. 0d.	1948	£41. 17s. 6d.

(f.o.b. per standard for 2½ in. x 7 in. u/s redwood.)

As the index of the cost of living has reached 839 while the index for timber prices has only reached 372 (1939=100), the difficulties of the Finnish timber exporters can easily be understood.

It is estimated that the great differences between export prices obtainable and the Finnish costs of production will cause a decrease in the exports of sawn timber, roundwood and prefabricated houses, but on the other hand the exports of other products such as paper, pulp, cardboard, etc. should increase.

Norway

Production

Fellings, which have shown considerable increases over the low levels of the years of the occupation, are still below normal. The comparatively low rate of fellings was due to lack of manpower. For the season 1948/49 fellings of 8 million m^3 (r) are envisaged and prospects seem to be good, the manpower situation having improved considerably.

The country's wood-working industry which was working up to 50 percent of its capacity during 1947 reached 75 percent of capacity during 1948.

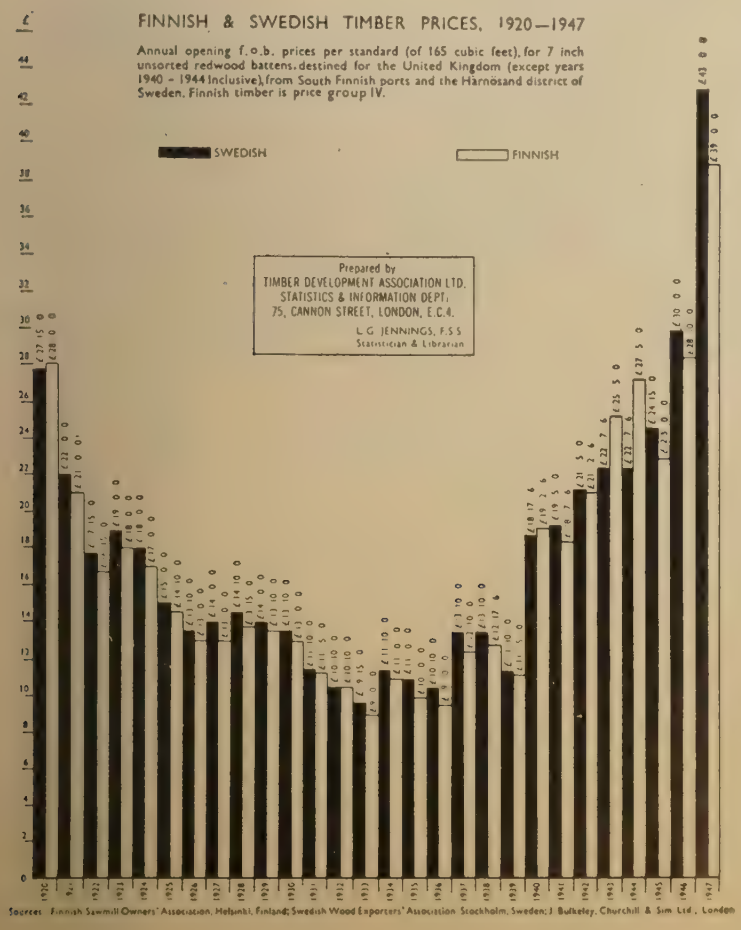
Norway's softwood lumber requirements for home consumption are considerable and will remain so for many years ahead. Annual consumption of sawn softwoods amounted to about 300,000 standards in 1947. Now production exceeds domestic needs and [illegible] sawn lumber are increasing. Sawn lumber is, however, rationed and its use without permit prohibited for house-building or even repairing.

Trade

Exports of sawn softwood, which amounted to only 2,000 standards during the first half of 1947, reached 4,600 standards during the same period in 1948 and 6,900 standards during the first three quarters of 1948. Exports consisted chiefly of flooring and boxboards. The principal destinations were:

	January-September	
	1948	*1947*
	(*Standards*)	
Australia	2200	
South Africa	1500	1200
Denmark	700	1900
Palestine	800	
U. K.	100	100

Softwood imports for Jan-Sept 1948 were reported to amount to 11,000 standards, compared with 16,000 standards in 1947.


FINNISH & SWEDISH TIMBER PRICES, 1920—1947
Annual opening f.o.b. prices per standard (of 165 cubic feet), for 7 inch unsorted redwood battens, destined for the United Kingdom (except years 1940 - 1944 inclusive), from South Finnish ports and the Härnösand district of Sweden. Finnish timber is price group IV.
SWEDISH
FINNISH
Prepared by
TIMBER DEVELOPMENT ASSOCIATION LTD.
STATISTICS & INFORMATION DEPT.
75, CANNON STREET, LONDON, E.C.4.
L.G. JENNINGS, F.S.S.
Statistician & Librarian
Sources: Finnish Sawmill Owners' Association, Helsinki, Finland; Swedish Wood Exporters' Association Stockholm, Sweden; J. Bulkeley, Churchill & Sim Ltd., London

Prices

The domestic prices of sawn timber have been fixed at a very low level. The wholesale price basis for floorings is 535 Norwegian kroner per standard, but export prices followed general tendencies of the world timber market, reaching an f.o.b. price of £50 per standard (less 2.5 percent) for red and white floorings, and an exchange guarantee was fixed at 20 NKr per pound sterling. Boxboard prices ranged from £70 to £75 per actual standard f.o.b. for average specifications.

Poland

The cession of the best forest areas in the east to Russia has greatly decreased the country's resources of raw materials and caused a strict rationing of timber supplies. Because of this loss, Poland, one of prewar Europe's principal timber exporting countries, will probably not export any great quantity of lumber.

The need for timber in Poland is enormous; according to estimates, about 762,000 houses were destroyed during the years of war. Reconstruction requirements are estimated at 32 million m^3 (s).

Production

During the first three quarters of 1948 production increased to 372,-

000 standards against 292,000 standards in 1947. Stocks, which on 1 October 1947 amounted to 70,000 standards, increased to 94,000 standards by 1 October 1948.

Trade

Exports, which averaged some 373,000 standards of sawn timber and 176,000 standards of saw logs during the pre-war years, reached 17,300 standards during the period January-September 1948. The United Kingdom, Belgium, and Netherlands were the principal destinations.

Prices

Prices have been on the same basis as those for Scandinavian timber. For example, sales to the Netherlands are reported at 466 Dutch guilders per standard (£43.10s.) f.o.b. Danzig.

Sweden

Fellings for the 1947/48 season began rather late in the autumn of 1947, and were hampered by exceptionally unfavorable weather conditions, and by the chronic shortage of labor in the forests. These factors decreased the estimated production by about 150,000 standards. In addition, the exceptional drought in the spring of 1948 partly paralyzed timber floatings and stranded about 100,000 standards of logs.

Consumption

Home consumption in 1947 was about 700,000 standards, compared with 725,000 standards in 1946 and an annual average of about 500,000 standards in the pre-war years 1935-1939. Building activity in 1948, however, was more restricted, and the Government control over construction more severe, so that domestic consumption in 1948 should show much lower figures, making more lumber available for exports.

Trade

The 1948 Swedish export market was opened at the end of March, when the Government released a quantity of 500,000 standards for export. In 1947 Sweden exported 405,570 standards, as compared with 391,932 standards in 1946. At the end of September 1948 exports were 324,000 standards as compared with 229,000 standards at the same time in 1947.

At the end of April 1948 negotiations with the United Kingdom led to an agreement for 162,000 standards at 1947 prices. This agreement did not satisfy the Swedish lumber exporters and was accepted with reluctance. Difficulties in meeting the buyers' offers were still great even when the extra duty of 100 Swedish kronor per standard imposed for exported timber was reduced to SKr 75 per standard.

Sales began exceptionally late, towards the end of May. Towards the middle of June 1948, Sweden had sold about 270,000 standards, but after that date sales decreased and there were only some occasional sales for the Mediterranean and overseas markets. At the same time negotiations with the German authorities of the Bizone led to a preliminary agreement. Prices were fixed on the same basis as the Belgian prices for redwood and the Dutch prices for whitewood.

In the middle of July the Swedish Government released an additional quantity of 88,000 standards for export, out of which 50,000 standards were for the United Kingdom, and 17,000 standards for the Bizone in Germany. However, the Germans having licenses for not more than 7,000 standards, the remaining 10,000 standards were available for other markets.

Prices

The Swedish home market for lumber faced great difficulties at the beginning of 1948, caused partly by very high sawlog prices and partly by increased wages, costs, etc. Prices were strictly controlled by the Government, and were fixed so low, that it is said that they did not even cover production costs. Consequently traders were unwilling to sell to the home market. This changed somewhat during the spring, but the differences between home and export prices were still great.

The prices obtained on various markets during the year 1948 up to the end of September were as follows:

United Kingdom: £43 net for 7 inch red u/s.

Belgium: £47 less 2½% for 7 inch red u/s and £59 for 7 inch red u/s boards with an extra £4 for 100 percent sideboards.

Denmark: £43.10s. and £43.15s. for 7 inch red u/s.

Netherlands: 635 SKr for 7 inch red u/s from Härnösand-Umea district.

Eire: £44.5s. for 7 inch red u/s.

South Africa: £50 for 6 inch red u/s.

Egypt: £52 for 7 inch red u/s and £53 for 6 inch red u/s.

The *utskott* (sixth or lowest grade exported) quality has proved extremely difficult to sell, as the buyers' demands for better qualities have considerably increased.

IMPORTING COUNTRIES

Belgium

Demand

In 1947 imports of softwood lumber accounted for 75 percent of estimated Belgian consumption. During 1948, bad business conditions, particularly in some export industries, combined with high prices, forced a reduction in lumber imports and in lumber consumption. Building activity decreased.

Pointing to a general price index of about 390, and a price index for imported lumber of about 500, it has been remarked that imported lumber is much too expensive for many of its previous uses. The use of domestic lumber has increased as has the use of wallboards, plywood, cement, and other building materials.

For the time being the Belgians are buyers of small dimension lumber of good quality from Scandinavian

countries and some minor quantities of special lumber from other countries.

Trade

Import demands were estimated at about 210,000 standards, but deliveries are not likely to have reached this figure in 1948. Only about 33,000 standards have been bought from Sweden, instead of the 80,000 foreseen in the commercial agreement, and only 20,000 standards have been bought from Finland. Even a small decrease in import prices owing to a drop in freight rates has not increased effective demand.

There has been a decrease in imports from the U.S.A., Czechoslovakia, and Brazil, claimed to have been due to the inferior quality and the high prices of the timber shipped, which did not always satisfy the Belgian buyers and which made it rather difficult to place it on the domestic market.

Prices

	Total import sawngoods (Standards)	*Average price per standard*
1945	11,980	£39. 0. 0
1946	52,700	54. 0. 0
1947	100,300	54.12. 0
1948 (Jan.-June)	26,300	54. 0. 0

Prices are for 2 in. x 7 in. redwood u/s from Sweden and it is to be noted that freights dropped during 1948 from between 190-210 to 120-140 shillings.

Denmark

To fight increasing import prices, prices have been fixed above which no import licenses were granted. As a result, price negotiations for timber between Denmark and the Northern exporting countries, Sweden and Finland, have been difficult and made exporters unwilling to meet the Danish offers for Swedish lumber, at £44.15s. for 7 inch red u/s battens; f.o.b. North Swedish coast mills, and £44.5s free on car inland mills. This concerns above all the Northern production which has always been most sought after in Denmark.

However, an agreement was made with Finland at £45.2s. per standard for 7 inch red u/s battens; in addition, purchases from Sweden commenced. From the USSR, the year's shipments were fixed at 10,000 standards from the White Sea district and 5,000 standards from the Russian Zone in Germany.

Shipments during the two first quarters of 1948 showed an upward trend, but decreased towards the end of the third quarter. Swedish authorities did not always grant export licenses when the Danish import license was already obtained. As a result only a small proportion of the 45,000 standards reserved have been shipped, and those almost without exception from the southern inland mills. On the other hand, Finnish and USSR shipments have continued regularly.

France

Demand

There has been a definite slackness in building activity through 1948 due to various causes. For one thing, the rent regulations in force limit returns from houses; further, since the currency reform, the credits required for completing buildings have been difficult to obtain. There has also been a falling-off in repairs to buildings, largely due to the same causes as the reluctance to construct new buildings.

In addition, the efforts to economize in the use of wood led in France, as in other countries, to a reduction in lumber consumption, as compared with prewar. As a result, the demand for lumber has been slight. These factors, together with the scarcity of liquid assets resulting from the currency reform, caused difficulties amounting to a crisis in the marketing of timber during the first part of 1948. This was apparent in a reduction of some 15 to 20 percent, as compared with 1947, in the amounts actually paid for deals and battens.

The prices for planed products fell below the official maximum prices. At the same time customers' requirements in the matter of grade became more exacting, and could not always be satisfied.

Production

Domestic production was on a normal scale in the 1947-48 season. The exceptionally severe bark-beetle attack among the softwood plantations in the Vosges, however, made additional fellings necessary, amounting to more than 1 million cubic meters. This timber in many cases could not be felled at the proper time owing to lack of labor and, having deteriorated, was an additional burden on a market already overloaded with these varieties.

Stocks of sawn wood were considerably reduced by the end of September. Stocks consist mostly of products of French origin, or from the French Occupation Zone of Germany. Supplies from the Scandinavian countries, which were much in evidence before the war, have almost entirely disappeared from the French market.

Prices

It was expected that it would be relatively difficult to market the roundwood produce of the 1948-49 season. However, the first public sales of roundwood were a great surprise, with increases in price from 80 to 100 percent. At the end of September 1948, logs of 120 to 158 centimeters, over bark, were being soold at prices of 1,800 to 3,000 French francs. To judge by these first sales, taking into account felling, transport and trimming costs, there is a definite lack of proportion between the prices paid for roundwood and those of sawn wood products. This paradoxical development should primarily be ascribed to the need to invest capital still available. This has been possible in spite of the prevailing shortage of capital, because a large proportion of the sales are carried out under easy conditions of payment, i.e. with a relatively small initial payment, and subsequent instalments. Market prospects for 1949 are better, since there will presumably be a sharp decline in timber imports from Germany, and in addition hopes are being placed in a revival of the building trade. Measures are now being tried with a view to infusing new life into the construction industry.

Greece

Demand

In Greece, as a result of reconstruction, the requirements of structural timber are very large—they have been estimated at approximately three million cubic meters. Domestic production of sawn softwood is very limited. Purchasing possibilities, on the other hand, are also extremely limited, foreign exchange being lacking. Effective demand was kept to a low level inside the country because of credit restrictions and a general lack of funds. There is approximately the same shortage for all grades of sawn wood, which are immediately absorbed by the market when available. On 1 January 1947 stocks stood at 7,000 standards and on 1 April 1948 at 11,000 standards.

Trade

Post-war imports, though increasing steadily, have not yet attained the 1937 figure of 63,000 standards. Thus in 1946 only 8,500 standards of sawn softwood were imported, rising to 18,800 standards in 1947; while for the first eight months of 1948 they amounted to 29,000 standards (including sawn hardwood). Imports were obtained mainly from Czechoslovakia, Sweden, and Finland in that order.

Prices

Despite the big demand, timber prices are in general stable, native sawn softwoods being sold wholesale at 500,000 drachmas ($50) per cubic meter, and imported sawn softwoods at 800,000 drachmas ($80) per cubic meter. Except that prices are controlled, there exist no other restrictions on sawn goods.

Italy

Demand

The decline in industrial production and building activity in 1948, in conjunction with the shortage of capital, soon affected the demand for timber and in particular for sawn softwood.

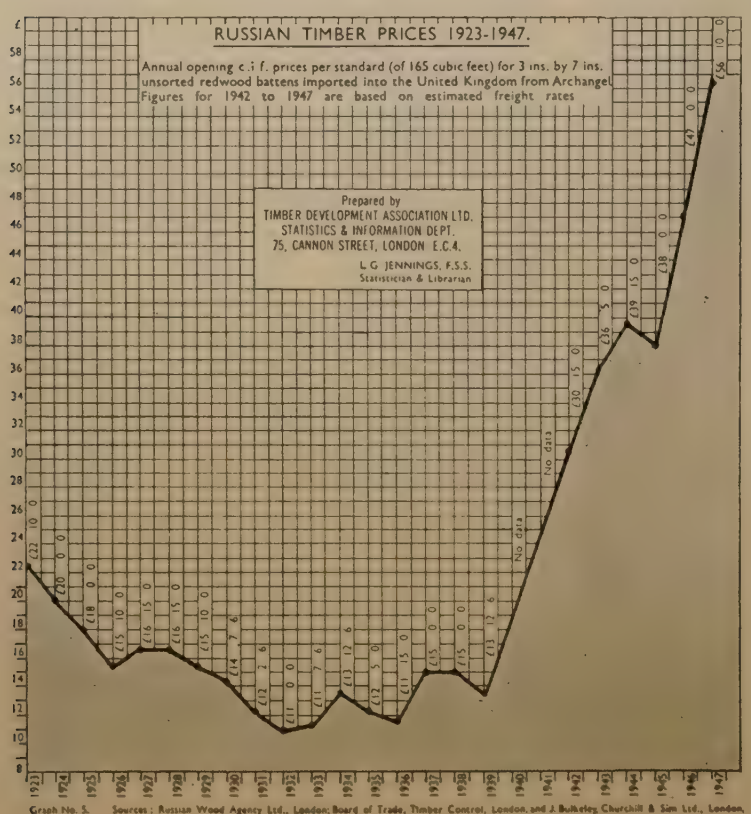
In the first six months of 1948, prices in the Italian market fell by some 25 to 30 percent. This slump in prices—the only one since the 1933-34 crisis—came unexpectedly, and disturbed the markets of the countries which are normally Italy's suppliers; as import requirements were considerably reduced, strong pressure was exercised on suppliers in the matter both of price and grade. Importers endeavored above all to reduce stocks, the more so as there was a general need to make assets more liquid.

Trade

Actual imports continued higher than in 1947, due to the fact that long-standing agreements had to be carried out, and also that timber had to be taken by Italian exporters, particularly of fruit and vegetables, as payment in compensation trade. It was frequently pointed out that the imports of timber, which were large in proportion to demand, contributed to the complete collapse of the Italian timber market, because the fruit and vegetable exporters had not the necessary technical knowledge to deal in timber, and tried to dispose of the timber as quickly as possible, even at a loss.

The main supplying countries were Austria and Czechoslovakia. As regards Austria, there were considerable difficulties in carrying out the contracts concluded, because Austrian grades did not always manage to satisfy the more exacting requirements. As all transactions were concluded on a compensation basis with internal price equalization, there is no question of prices being determined by value.

Yugoslavia, which supplied a considerable proportion of Italy's requirements before the war, has been unable to establish a footing in the Italian market up to the end of 1948. The quotas laid down by trade treaty, which were to be taken up by Italian importers, could only be drawn on to a small extent, owing to price difficulties. The Italian timber market showed some signs of recovery towards the end of 1948.



Graph No. 5. Sources: Russian Wood Agency Ltd., London; Board of Trade, Timber Control, London, and J. Bulkeley Churchill & Son Ltd., London.

Netherlands

Demand

The demand for timber remained very great through 1948, as in the consumer industries, such as building, furniture manufacture and shipbuilding, business was still very brisk. The building of new houses is assisted by Government credits. As a result of the shortage of foreign exchange, the Netherlands is not yet in a position to cover the demand by importing, so that a strict internal allocations system for softwood is still applied.

Dutch buyers, as far as timber for building and for joinery is concerned, are primarily interested in taking Scandinavian and Russian material. The relatively large imports from Central European countries saturated the market, whereas the demand for Scandinavian products could not be met. In this connection it is significant that the Central European products are expensive in relation to the grades actually delivered.

Stocks are small since it is not feasible for importers to stock large quantities of timber. Prices have risen eight times as compared with 1935, and three and one-quarter to four times as compared with 1938-39.

Trade

The main supplying countries for the Netherlands, in 1948, were Sweden, Finland, Czechoslovakia, the Bizone of Germany, Yugoslavia, Poland, Austria and the USSR, while France and Rumania played a minor part.

SWEDEN occupies the first place as a supplying country, with 75,000 standards. Imports purchased in this country comprise approximately 13,000 standards of box-making materials, and 12,500 standards of material for making doors; the remainder consists of products for joinery and house building.

FINLAND. The trade agreement with Finland provided for 32,000 standards, about one-third of which is taken up for box-making, the rest being used for building. As compared with Sweden, the Finnish lists are less suited to the Netherlands' requirements.

CZECHOSLOVAKIA. Provision was made for importing from this country some 150,000 m³ (s), i.e. about 32,000 standards. The whole of this quota has been taken up in the form of 70,000 m³ (s) of building timber and approximately 50,000 m³ (s) of box wood.

YUGOSLAVIA. The trade agreement provides for the supply of 80,000 m³ (s) of timber, to comprise 5 to 10,000 m³ (s) of box board and 70 to 75,000 m³ (s) of building timber. In 1947 the Yugoslav production was not satisfactory in the matter of lengths (which were nearly all 4 meters) but it was hoped that in 1948 lengths better graded to suit demand would be supplied.

GERMANY. The agreement between the Netherlands and the American military authorities in Germany provided for the importing of 140,000 m³ (s) of sawn softwood, at a price of $33 per m³ f.o.b. Rhine Port.

POLAND. 40,000 m³ of building timber and box board were purchased and deliveries began in the Autumn of 1948.

USSR. The trade agreement with this country provides for 150,000 m³—32,000 standards to come from White Sea ports.

FRANCE. Under a trade agreement, France was to supply 20,000 m³ of "pin des Landes" as box board in lengths of 2 to 3 meters. There are, however, great difficulties connected with selling this product.

RUMANIA. Smallish amounts have been sold to Export-LEMM for the Netherlands. High frieght charges are however, making business difficult.

Prices

The resale prices in the Netherlands are controlled. There is a standard price for all building material. In order to make up the difference in prices for imports as between the various varieties, a price equalization fund has been established to which importers must contribute or, alternatively, from which they receive a contribution, according to the price paid. At the same time the fund acts as an emergency fund, which takes the first shock when there is a change in the market position.

The prices paid for the best Swedish productions of 7-inch battens,f.o.b. varied from 630 to 640 SKr

While Swedish f.o.b. prices of timber have not been very different from 1947, there was a possible reduction in the case of c.i.f. prices as a result of the lower freight rates. In 1947, rates of £9 per standard from Sweden, and £10 and over from Finland, were normal. In 1948 the rates from Sweden were £5.10s.6d. to £5.17s.6d. i.e. more than £4 under 1947. This difference is large enough to have had an effect on selling prices.

Building material was bought from Finland at list prices, f.o.b. 2½ x 7 inches u/s whereby a margin of 7s.6d. up and down was left to sellers and buyers for negotiations.

1st group	£42.17s.6d
2nd group	£42.12s.6d
3rd group	£42. 7s.6d
4th group	£41.17s.6d

Switzerland

Demand

For the first nine months of 1948 consumption of and demand for softwood remained at a very high level. Yet the proportion of timber used in building and in the packing industry declined sharply in comparison with pre-war years. This decline was more than offset by the increased activity in the industrial field. However, the rapid progress made in the substitution of other materials for timber is generally viewed with concern, since this affects the marketing prospects of Swiss timber, once industrial and building activity has returned to the normal level.

The great demand for first and second grade products, however, could still not be fully met, despite

great efforts made to import from Austria, Czechoslovakia and Yugoslavia.

Production

The supply position steadily improved over the first three quarters of 1948. Domestic production of constructional timber in the felling season 1947/48 amounted to roughly 120 percent of the normal figure; large quantities of insect-damaged timber had also to be felled in the spring. In consequence, taken as a whole, home-produced supplies were large in comparison with normal years.

Stocks of sawn timber increased during the first nine months of 1948 from 221,000 m^3 (s) as of 1 January to 324,000 m^3 (s) as of 31 August, the stocks of roundwood in the same period from 438,000 m^3 (r) to 510,000 m^3 (r) in spite of the fact that there is usually a drop in stocks at this period.

Trade

As regards imports, the most important were the deliveries of roundwood from the French Occupation Zone of Germany, totalling 196,000 m^3, i.e., about 14 percent of Swiss normal production. Despite the great demand, this flooding of the market with Swiss and German roundwood led in the third quarter to a saturation of the market, as far as wood for building and boxes was concerned, resulting in a recent decline from 10 to 15 percent in the prices of these grades.

In the first nine months of 1948, 34,000 m^3 (s) were imported from Austria as against 32,000 m^3 (s) in 1947. It is said that the quality of Austrian production did not altogether satisfy the Swiss buyers.

The deliveries from Czechoslovakia, amounting to 3,600 m^3 (s), were insignificant. The quantities agreed upon could be traded only up to 15 percent, because of existing price differences and other difficulties.

Prices

The increase of about 10 percent in the price of roundwood which the forestry industry introduced in the autumn of 1947 was reflected, though in lesser degree, in the prices of sawn products. The removal on 1 October 1948 of all control and price regulations for all grades of timber was followed by an agreement in principle between forestry interests and sawmills to maintain 1947 prices for roundwood over the felling period 1948-49. Apparently, however, it is very difficult at present to maintain the corresponding price level for sawn timber in the grades used for building and boxes.

United Kingdom

Demand

At the beginning of 1948, the authorities planned to import a million standards. On the other hand, at the Timber Committee of ECE, an essential need of 1,650,000 standards was announced. In comparison with actual imports of 2,366,000 standards in 1937, consumption has fallen considerably.

The Government's anti-inflation policy had already begun to produce its effects in the first and second quarters of 1948 in the form of a slackening of demand for a large number of consumer goods. The measures adopted also undoubtedly had some effect on the demand for timber, and it is obvious that price considerations are assuming more and more importance. The efforts of the Government to keep down the level of costs over the whole field of industry, including the timber sector, have an added significance in view of the balance of payments. The rise in the volume of exports in the past year was partly offset by import price rises, especially of timber, which have risen much more sharply than those of exports of other commodities.

The main features of the British timber market in the first nine months of 1948 were as follows:

On the whole, demand in the country was steady. It was, however, limited by the Timber Control, which granted consumption licenses averaging about 80,000 standards a month.

The demand also varied to some extent as between the different grades. The high grade timber, i.e. joinery qualities, was most sought after, whereas there was a temporary decline in February, March and April in the demand for the big sizes imported chiefly from the U.S.A. and Canada. The demand for the Scandinavian varieties of first class timber was especially marked in those months.

Consumption

The building industry continues to be the chief consumer, the wood being used primarily for house building, where at present authorized use is limited to 1.6 standards of softwood per dwelling. The technical possibilities of saving timber have been systematically developed in this field, both scientists and builders playing their part in achieving this result. Home-produced substitutes for timber, such as cement and steel, are drawn on to the greatest possible extent.

Another important consumer, the box and packing-case industry requires about 300,000 standards a year, i.e. just under a third of the imports planned for 1948. With increased exports of industrial products, requirements in this sector are rising, although here again substitute materials like cardboard (paperboard) are being used to the greatest possible extent.

Production

Domestic production of sawn softwood represents a very small proportion of Great Britain's supplies.

As regard supplies, the position at the beginning of 1948 was considerably better than in January of the previous year. Stocks were as follows:

1 Jan. 1947 215,000 standards of which 205,000 were imported.

1 Jan. 1948 615,000 standards of which 607,000 were imported.

For comparison, imports in 1939 totaled 2,300,000 standards and stocks in January 1939 totaled 880,000 standards.

Trade

IMPORTS OF SAWN AND PLANED SOFTWOOD
(excl. boxboards)

Year	Quantity 1000 standards	Value £1000	Value (CIF) per standard
1938	1778	24	£13.13s.6d
1946	737	31	£41.13s.
1947 (Jan-Aug)	776	37	£47.16s.
1948 (Jan-Aug)	562	31	£55. 3s.

The increase in the average price per standard between 1947 and 1948 is partly accounted for by differences in the grades of timber imported, since export prices (f.o.b.) in the main exporting countries have shown little or no increase and freight rates are lower than in 1947.

In the early part of 1948, owing to the small shipments, freight rates from the Scandinavian countries showed a sharp downward trend, which continued until the end of the third quarter even after the contracts with Finland and Sweden had been concluded. In comparison with last year the rates from the ports of Central Sweden to London fell by 30 to 40 shillings per standard.

Of outstanding importance were the price negotiations with the Scandinavian countries, Sweden and Finland, imports from which in 1948 were expected to total 162,000 and 140,000 standards respectively. In view of the relatively large stocks at the beginning of the year and the effects of the deflationary policy adopted, price reductions had been hoped for. Exporting countries, however, proposed an increase of about £7 over the 1947 prices.

Negotiations with Sweden which were concluded at the beginning of May led to an agreement on the same basis as 1947, i.e. £43 for 7 inch u/s redwood battens from central Sweden and £47.10s. (f.o.b.) for 3 in. x 9 in. u/s redwood. Subsequent negotiations with Finland led to a slight price increase over 1947, namely, £41.12s 6d. (f.o.b.) for 7 inch u/s redwood Group I, as against £40 in 1947, and £41.2s. 6d. for 7 inch u/s whitewood Group I as against £39.10s. in 1947. The increase in prices of Finnish lumber is explained by the Finnish claim that the prices received in 1947 were too low, particularly in view of prices paid to Sweden.

Purchases were as follows:

Time	*From Sweden*	*From Finland*
to 30 March	----------	----------
to 30 June	94,000 stds.	89,500 stds.
to 30 September	180,200 stds.	135,500 stds.

During September new quotas were fixed with Sweden for an additional import of 50,000 standards, but it seemed doubtful whether the whole of this quantity would be utilized, since Swedish stockpiles in the sizes desired were already seriously depleted.

Up to 30 September 1948, 112,000 standards of lumber of which 99,000 were sawn planed softwood had been imported from Sweden and 108,000 standards of lumber of which 107,600 were softwood from Finland.

From the USSR about 32,300 standards had been purchased at the end of September, at the following prices: 7 inch red u/s battens at £43.10s. per standard; 7 inch white u/s at £43 f.o.b. White Sea and Leningrad, German redwood from the Russian Zone is at £40.10s. for u/s and £37.10s. for Group IV f.o.b, for a specification averaging 6 inch, deals, battens and boards. Further sales were expected to bring the total up to about 50,000 standards.

In the first three quarters of 1948, England purchased 100,000 standards from Yugoslavia and 40,000 standards from Poland and 25,000 standards from Rumania. Yugoslavia and Rumania are to supply mainly white wood and Poland mainly redwood.

Shipments from Canada and the U.S.A. during 1948 were being made on 1947 contracts. The quantities covered by new agreements have been drastically reduced, owing to the shortage of currency. Up to the end of September a total of 208,000 standards sawn softwood were imported, including 5,000 standards boxboard from Canada and 63,500 standards from U.S.A.

The 1948 contracts up to 30 September 1948 were 80,000 standards from Canada while no contracts had been concluded with the U.S.A.

Imports of round and sawn wood from Germany played a considerable part in supplying the British market with sawn softwood. In the first nine months of 1948 there had been imported about 133,000 standards (56,000 standards, sawn wood and 77,000 standards in sawn equivalent of German logs). Imports during 1949 will probably fall off considerably or cease altogether.

Near East

General

The sawn softwood market in the Eastern Mediterranean area, in Palestine, Egypt, Syria, Iraq and Iran, has been hampered by prevailing political conditions. The economy of these countries has been affected by the war in Palestine, with all its secondary effects such as increase of prices, lack of credit, little investment activity, and so on. In addition the lack of hard currency also hampered imports very much.

Trade

The Near East played a fairly important role in the central European timber market during the first year after World War II, but now there is a comparatively small demand. Rumania and Yugoslavia take the first place as suppliers, and Portugal and Austria also seem to be interested in certain deliveries. Syria has contracted for 12,000 m^3 (s) Syrian quality (= Grade V-VI) at $31 to be delivered in Constanza and 4,000 m^3 (s) Yugoslav timber of the same grade at 150 Swiss francs c.i.f., portions of which have already been imported. Palestine imported several shipments of "merchantable" at $270 per standard c.i.f. and "common" at $210 c.i.f. from Canada. It may

also have received 10.000 m^3 (s) "Alexandriner" at £12 per m^3 (s) f.o.b. Constanza. While Iran is able to cover its requirements out of its own production, and does not import to a great extent, Iraq gets supplies from the East.

Egypt, which was a fairly important buyer on the market in pre-war years, shows little demand today. Currency difficulties cause Egypt to try to meet its requirements by barter agreements for cotton. Such agreements may have been made with the USSR and Yugoslavia.

EXCHANGE RATES

Units of National Currency per U. S. Dollar

	1947	*1948*
Pound sterling	0.248	0.248
Norwegian krone	4.97	4.97
Swedish krona	3.60	3.60
French franc	119 [1]	207 [1]
	[2]	309 [2]

Source: *Monthly Bulletin of Statistics*, Vol. III, No. 1-2, Jan-Feb 1949 (Statistical Office of the United Nations).
[1]Official rate.
[2]Free rate.

Fiberboards

A commodity report under this heading, appeared in UNASYLVA, Vol. II, No. 4. The report dealt with commodities which are also classed as "Fiber Building-boards." The editor of *The Paper Container*, a United Kingdom publication, has pointed out that the use of the term "Fiberboards" in respect to these commodities may be misleading. In the industry fiberboard is properly "a cardboard product made from vegetable fibres," our correspondent states, "and the first record of a vegetable fibre being used to form paper or board dates over 200 centuries B.C. when the Egyptians used the tissue-like fibre of papyrus gummed in layers to form a type of paper. In the second century A.D. there is a record of a Chinese invention for making paper from the cellulose fibres of the inner bark of the mulberry tree, and this method of paper manufacture was adopted in Asia and Europe until the fifteenth century, when rags were pulped to make sheets of paper. The first boards of paper were used as bindings for books and were made of sheets of paper pasted together, since when improvement after improvement has taken place until the present product known as fibreboard was produced in an elementary state early in the nineteenth century.

"Fiberboard is not mainly used for building purposes, but as the raw material for containers, an industry which is considerably larger and more important than the building board trade. As for the origination of the fibreboard industry, as it is known today, the Thames Board Mills, Ltd., at Purfleet, Essex, in this country, began the manufacture of such a board in 1903 and made the first containers from this board in 1909, the board being known in the industry as solid fibreboard."

The Work of FAO

Fourth Session of the FAO Conference

The Fourth Annual Conference of the 58 member countries of FAO opened at Washington, D.C., the temporary headquarters of the Organization, on 15 November 1948. More than 350 delegates and observers attended the session, which was the first to be held in the United States of America, previous sessions having been held at Quebec, Copenhagen, and Geneva.

The Conference was confronted with a very full agenda and had to concentrate its work into a limited period of time. The 18-nation Council of FAO had, however, previously drawn up a suggested program for the Conference proceedings, and this program was closely followed, enabling the various meetings to deal expeditiously with the matters in hand.

During the two-week session the Conference admitted Saudi Arabia to membership; referred the application of Israel to the FAO Council for further consideration; admitted the Holy See to the status of permanent observer; deferred action on a permanent site for FAO pending further study by the Council and a report, preferably to a special session to be called by the Director-General; selected Havana as the seat of its next Conference and tentatively fixed 19 November 1949 as the opening date; voted to set up a special committee to review the contribution scale of the member nations; and took steps looking toward the creation of inter-governmental commodity agreements after hearing a pledge of support from President Truman of a new International Wheat Agreement.

At opening plenary sessions the Conference, in addition to choosing Charles F. Brannan, United States Secretary of Agriculture, as Chairman, named V. K. Wellington Koo, the Chinese Ambassador, as First Vice-Chairman; Senator José Manuel Casanova of Cuba as Second Vice-Chairman, and James M. Dillon, Minister of Agriculture of Ireland, as Third Vice-Chairman.

Early in the session the Conference resolved itself into three Commissions, where the bulk of the Conference work was done.

Commission I, presided over by Viscount Bruce of Melbourne, independent chairman of the FAO Council, reviewed the general world situation for food, agriculture, forestry and fisheries, and laid down the further policies to be pursued by FAO and its member nations.

Commission II, under the chairmanship of Mr. B. R. Sen, Secretary, Ministry of Agriculture, Government of India, examined the technical activities of the Organization for the past year and its plans for 1949, with the object of ensuring that the work of FAO, within its limited budget, was compatible with the specific objectives agreed on by the Conference.

Commission III, with Mr. Arthur Wauters, President of the Belgian National FAO Committee, in the chair, dealt with the financial and administrative matters of the Organization.

At the final plenary session, the Conference formally adopted the reports of the three Commissions, thus giving the reports full Conference sanction and the authority of Conference recommendations.

Findings of Commission I

Discussions took as their starting point two documents submitted by the FAO secretariat. These were *The State of Food and Agriculture—1948*, a comprehensive 200-page survey of world conditions and prospects based on the latest information and statistics available; and *National Progress in Food and Agriculture Programs—1948*—a 150-page summary and analysis of the annual reports submitted by member governments in compliance with Article XI of the FAO Constitution.

In adopting the Commission's report, the Conference noted that the year 1948 had been particularly favorable to agriculture, but found the output of forest products still insufficient in the face of greatly expanded demand.

The Conference declared that the grievous unbalance between the economies of the different regions constitutes the principal economic problem of our time. It reached the conclusion that unless positive action is taken, the result of the present situation might well be aggravated disequilibrium in many spheres—a glut in some areas, deficit in others; a glut of one commodity and shortage of another; unexportable surpluses in one region for lack of the necessary foreign exchange elsewhere.

Five regional subcommittees of Commission I prepared reports on production and consumption problems in their areas. These reports were for Europe, the Near East, Africa, the Far East, and Latin America. The Conference requested the Council of FAO and the Director-General to keep the reports under constant consideration, with a view toward implementing progressively the suggestions and recommendations which they contained.

Amongst the references to Forestry and Forest Products which these reports contain are the following:—

Far East

Forest Utilization and Conservation

Forest conservation is basic to increased production of rice through assuring water supplies for irrigation. The utilization of forest products is hardly less important. It is fundamental to the supply of indigenous fertilizer in many Asian countries, where cowdung must, for lack of fuel, be utilized for cooking fires. Industrialization must depend on near-at-hand raw materials, of which timber is one of those most readily converted with a comparatively small outlay of capital. Furthermore, the incomes of rural people in many countries of Asia can be augmented by part-time employment in logging and other woods operations.

For these reasons the Conference recommends the holding of the Forestry and Timber Utilization Conference for Asia and the Pacific, and submits that many of the problems mentioned above can be profitably considered at this conference.

Near East

Increase of Cultivable Area

The Conference recommends that governments in the Near East co-operate in the development and utilization of common water resources, and urges governments to acknowledge the regional significance of certain streams and rivers in an effort to reach permanent agreements concerning these water resources; that where soil erosion is extreme, gov-

ernments take steps to conserve the land in connection with reforestation measures; that governments take steps to prevent overgrazing resulting in serious soil erosion and deterioration of the soil, and through legislation and other measures, establish control over grazing; intergovernmental exchange of information on related conditions and experience would be advantageous.

Governments and Other Services

In order to carry through a well-planned economic program in the vital fields of production and consumption - to increase the area of cultivation and to improve existing agricultural practices —it is often essential for underdeveloped countries to seek the assistance of foreign technical experts in the fields of agriculture, forestry, fisheries, nutrition, etc. Therefore, the Conference stresses the importance of making experts available, either through FAO and other international agencies or through member governments equipped with facilities for training the type of experts needed. The Conference realizes the present difficulty in obtaining a sufficient number of experts in various fields, but thinks that every consideration should be given to the requirements of underdeveloped countries, whose economic development schemes should be initiated as soon as possible.

EUROPE

Forest Products

World wood pulp problems, especially those of supply and distribution, have particular importance in view of the uncertain outlook for productive capacity and supply of wood pulp in various parts of the world. It is proposed that a preparatory conference should attempt to survey the world situation and outlook and should formulate a program of regular international statistics. The timber equipment program developed with regard to Europe will, it is hoped, constitute an important demonstration of the practical advantages to be gained from international cooperation.

The Conference notes the timber program undertaken in Europe through cooperation with the Economic Commission for Europe and the International Bank for Reconstruction and Development, and believes that the experience gained in this instance should receive attention in Europe and should be considered when planning for similar action in other regions.

AFRICA

Forests

Forests are important in Africa, both as natural resources and as a means of exercising an influence over the natural environment. Efforts must be made to obtain a more exact appreciation of the importance and value of these resources. The Conference is appreciative of the fact that FAO has given full attention to the problem: in both 1947 and 1948 the Organization has published an inventory of forest resources; and it has also made contacts with forestry centers in Africa itself.

The Conference recommends that permanent contacts be established with forest research stations in Africa, and recommends that governments develop colonial forestry centers.

LATIN AMERICA

Forestry and Forest Products

The Conference wishes to emphasize the importance of creating forest services in Latin America and training personnel, especially large numbers of practical forest workers, such as forest wardens. This is a phase of forest service development that governments can begin immediately within their countries, offering to each other the facilities now available or to be created in the near future for training such workers.

To increase the output of forest products, the Conference urges governments to bear in mind and take measures to implement the resolutions adopted at the Conference on Forestry and Forest Products convened by FAO at Teresopolis, Brazil, 19-30 April 1948; and recommends the creation of forest nurseries to provide planting material for use on individual farms.

With regard to the recommendation of the Teresopolis Conference that a forestry research center be created for the benefit of the Latin-American countries, the Conference recommends that FAO study and report to its member governments in Latin America on the cost of establishing and operating this center; and further, recommends that this study be made by the Forestry Office which FAO will establish in Latin America.

Soil Resources

Latin America as a whole suffers from rapid depletion of its soil resources through erosion brought about by such malpractices as uncontrolled forest clearing and burning to prepare land for planting. The Conference calls the attention of governments to the resolutions of the Inter-American Conference for the Conservation of Renewable Resources, held at Denver, Colorado, in September 1948, and of the Teresopolis Conference on Forestry and Forest Products. The need is stressed for maintaining a continuous effort to educate agricultural producers and the public opinion in general concerning the importance of conserving soil, water, and forest resources. In particular, the Conference urges governments to be aware of the need for introducing knowledge concerned with habits and practices of conservation into the subject matter of the school systems.

In planning agricultural resettlement and development programs, governments are urged to take account of the danger to which soil, water, and forest resources of the areas concerned may be exposed in such schemes, if adequate protective measures are not taken in time. This is of particular importance with regard to the clearing of tropical forest areas to provide cultivable land, since there exists great danger that the exposure of such soils to cropping conditions may bring on rapid or irrevocable loss of their fertility. The Conference urges governments to obtain technical advice from FAO concerning the uses to which such tropical forest soils can safely be put in order to maintain their productive power: recommends that governments strengthen measures for preventing forest fires, repeating in this connection the recommendation for training adequate numbers of forest wardens.

Government Services

The Conference recommends that governments strengthen their services in the fields of agriculture, forestry, fisheries, and nutrition, including statistics, with special emphasis on the training of workers for these various services, without neglecting the training of workers at practical levels.

PROCEEDINGS OF COMMISSION II

This Commission reviewed the Director-General's *Work of FAO—1947/48* and devoted considerable time to a detailed examination of the *Program of Work for 1949*. It expressed its appreciation of the high quality of work which the staff had performed, sometimes under very difficult circumstances, and congratulated the Director-General on the clear presentation of the projects selected for 1949.

It was aware that he had been given a difficult task in selecting projects from the several hundred recommendations emanating from past Annual Conferences and other sources. He had to take into account a variety of sometimes conflicting considerations and the program of 1949 constituted an inevitable compromise.

The Conference felt that, in view of the limited size of the FAO budget, the approach adopted in preparing the program for 1949 compelled the Director-General to spread the activities of the Organization too thinly over too large a number of projects. In determining the order of priorities for particular projects, FAO should give the greatest weight to those which contribute to the welfare of the largest number of people. While, therefore, regional and national projects provide an important field for FAO's work, those projects with world-wide effects should obviously be given precedence.

The Conference commended to the Director-General the following suggestions:

1. The vital test of the budget of each division should be the priority of its projects and its contribution to the FAO program as a whole, and not a predetermined share of the total funds.
2. In order to set free for technical work the largest possible proportion of the annual budget, every effort should be made to reduce expenditure on administration and services.
3. The major projects will often be the concern of more than one division and will need to be executed by interdivisional teams organized on a "combined operations" basis. For this purpose it will be essential to ensure both the closest possible integration of divisional and regional activities, and the clear allocation of ultimate responsibility for each project. Projects should, where appropriate, provide for extension and educational activities properly adapt-

ed to the local conditions of the countries to which they may apply.

4. FAO should not itself undertake technical research. Accordingly it should not recruit to its permanent staff experts too specialized in too limited fields.

The Work of the Forestry and Forest Products Division

The work of the Division was reviewed on 22 November. Owing to the little time available, the technical aspects of the Division's work could not receive the critical appraisal which had been hoped for. This was not so serious a defect as might at first appear, since the past work and future program had already been examined and endorsed by the Standing Advisory Committee for Forestry and Forest Products at a meeting in Washington earlier in the year.

Unfortunately, few delegations numbered forestry specialists amongst their members, but the Director of the Division, Mr. Marcel Leloup, was able to hold several informal meetings with these specialists prior to the main Commission discussion and clear up many points of interest.

Dr. Anton Ceschi (Austria) was appointed by the Commission as Rapporteur when it came to deal with forestry and forest products. Dr. Ceschi is well conversant with the work of the Division and was able to point out salient features for special consideration by the Commission.

In introducing his report, Mr. Leloup confined himself to speaking about the method of approach to the Division's work that had been adopted and the reasons for this choice.

"The program of the Interim Commission as confirmed by the Quebec and Copenhagen Conferences, had envisaged the Division's staff on a global scale, with a great number of technicians covering every branch of forestry and forest products. This was soon found to be impracticable, owing to the limited funds at our disposal.

"We had to adapt our approach to these limitations. Moreover, certain new concepts had emerged from the practical work of the Division that could not have been envisaged by the delegates of the Interim Commission. To be more effective, the work of the Division must be decentralized: at present our main effort must be centered on regional work.

"As you know, the aim of FAO, where forestry is concerned, must be to aid governments to co-ordinate their efforts so that the production of the world's forests may satisfy the needs in forest products of the world's population. The problems confronting each region vary greatly. For European or North American foresters, the problem is one of better management and greater protection of their forests. For Latin-American foresters, it is the development of unexploited forests, and that is also the problem of the tropical and equatorial regions of Africa. In the Far East, the most pressing question is that of re forestation, both for the conservation of the soil and for the supply of necessities, such as fuelwood.

"Thus the Division's regional work has fallen into three distinct and successive stages:

a) preliminary investigations of problems;

b) setting up the machinery for regional work, starting with a Regional Conference that states the problems and outlines the means of attacking them, and leading to the establishment of a Regional Working Group for forestry and forest products;

c) the regional work itself carried out by the countries' technicians with the assistance of the officers of the Division seconded to that region.

In Europe, we are at stage (c), In Latin America at stage (b), in Asia at stage (a), and by 1949 we hope to start work in Africa.

"It has been necessary, as I have already pointed out, to establish priorities, priorities which moreover were recommended by you at previous conferences, but I hope that with your help we can rapidly eliminate the time lag and bring all regions up to the same stage of regional work.

"I must draw your attention to another point which is equally important. Because of the small number of forestry technicians permitted by the Division's budget allotment, it has not been feasible, as the Interim Commission had hoped, to cover all technical aspects; it is not possible to assemble within an international organization all the specialists of international reputation that would be needed, since the countries which are fortunate enough to possess them cannot put them at the permanent disposition of FAO.

"In view of this situation, it appeared more advantageous that the Division, rather than undertake all work of this type itself, should seek assistance of the best technicians through its technical committees and that, at the request of FAO, they should be called for consultation, FAO maintaining only the secretariat work, thus ensuring co-ordination and information."

1949 Program of the Division

The Conference, in adopting Commission II's report, expressed satisfaction with the results of the work of the Division. Although in certain respects they fell short of what was desired, they constituted a maximum accomplishment for the funds and staff available to the Division.

The Conference gave general approval to the future program of work which constituted a reasonable selection of projects.

It drew attention to the necessity for close co operation between the Divisions of Agriculture and of Forestry on the urgent question concerning the relationship between shifting cultivation and forests in tropical countries. It emphasized also the interest attached to the projects already undertaken or proposed concerning such subjects as uniformity in common and commercial names of tropical woods, forestry legislation, the problems of technical forestry training in countries with forest resources, and "forestry combines," all offering possibilities of co-operation with different organizations already in existence.

A certain number of points in the program were singled out for particular attention in the final report.

1. Regional Activities

The Conference stated that regional activities constitute the best means of developing regional forest policy by co ordination of national programs and stimulation of intra-regional trade.

It invited the European Forestry and Forest Products Commission to submit its findings direct to the Council of FAO, and European Governments to give the Commission continued support and to facilitate the work of any subsidiary or affiliated bodies to be established.

The Conference approved the conclusions and recommendations contained in the report of the Latin-American Conference on Forestry and Forest Products, and urged all governments concerned to take measures to implement the recommendations. It invited all governments of Latin America to co-operate in the establishment of a Commission for Forestry and Forest Products, which should hold its first meeting during 1949, and urged these governments to establish five-year programs for the development of their forests and forest industries. It requested that the proposals to establish a central Latin-American forestry institute and research center be actively followed up.

The Conference also noted with approval that a Forestry and Timber Utilization Conference was being organized for 1949 to examine the particular problems of Asia and the Far East, and of the Pacific area. It expressed the hope that all governments of the region would participate and include qualified technicians in their delegations.

It recommended that FAO should devote early attention to assisting the Asian governments in coordinating their efforts toward the study of (a) methods of increasing fuelwood supplies through the establishment of fast-growing trees, (b) methods of combining cattle grazing with growing trees, where suitable, and the proper utilization of forest range lands, and (c) methods of increasing production of so-called minor forest products such as lac, honey, wax, and medicinal products.

2. Relations with Other United Nations Agencies

The Conference expressed satisfaction with the progress achieved in Europe with regard to increased timber production and export through the timber equipment program carried out in co-operation with the Economic Commission for Europe and the International Bank for Reconstruction and Development. It recommended that co-operation along these lines should serve as a pattern for similar action in other regions.

It urged continued co operation with the International Refugee Organization, UNESCO, and other international agencies with the aim of facilitating the settlement of forestry technicians and workers, anxious to find new homes in

countries needing trained personnel for the development of their forests and forest industries. Co-operation with UNESCO in connection with the Preparatory Conference on World Pulp Problems was welcomed.

In connection with the Division's regional programs in Latin America and the Far East, the Conference approved the Director-General's intention of establishing close working contacts with the Economic Commission for Latin America and with the Economic Commission for Asia and the Far East.

3. Relations with Other International Bodies

The Conference considered that it was FAO's responsibility to co-ordinate all activities concerning the forest and its products, and to ensure direct and close contacts between technicians and research organizations.

It invited the Director-General to implement the agreement arranged by the International Union of Forest Research Stations and FAO. It also expressed satisfaction with the organization and work of the International Poplar Commission and with the working agreement concluded with FAO. It urged that all interested countries should become members of this Commission, and also of the proposed International Chestnut Commission.

4. Third World Forestry Congress

The Conference was gratified to learn of the invitation from the Government of Finland to hold the Third World Forestry Congress at Helsinki in July 1949. It hoped that the Congress would be widely attended by forestry experts from all parts of the world, and requested the Director-General to report the results of the Congress to the next session of the FAO Conference.

5. Preparatory Conference on World Pulp Problems

The Conference considered that FAO should devote more attention to the important commodity, wood pulp. It expressed appreciation of the co-operation of the Government of Canada and the Canadian Pulp and Paper Association in offering to hold a preparatory conference in Montreal. It urged all interested countries to participate actively.

6. Forestry requisites

The Conference recommended that the Division should devote increased attention to the problem of forestry requisites and modern equipment for forest industries, and continue its activities in advising governments about new techniques, possible sources of equipment, and the financing of procurement programs.

7. Forest Statistics

The Conference noted that the forestry statistics published included *Forest Resources of the World, Yearbook of Forest Products Statistics,* and the bulletin produced in co-operation with the Economic Commission for Europe. It called the attention of governments to the fact that incomplete information and delays in returning questionnaires militate against the effectiveness of FAO's work in this field. The Conference emphasized the importance of periodical surveys of forest resources. It also recommended that the proposals on forestry and forest products statistics contained in the report of the first meeting of the European Forestry and Forest Products Commission should be given due consideration in the future activities of the Division.

8. Technical Progress

The Conference stressed the importance of establishing forestry schools in all countries having important forest resources, and recommended that the studies initiated by FAO in forestry education be actively continued. It urged member governments to co-operate in the development of training centers in the fields of forestry and forest products.

It also recommended that FAO continue its work towards standardizing methods of testing wood products, and its work on wood chemistry.

It drew attention to the urgent need for rational development of the world's unexploited forests; stressed the importance of establishing integrated forest industries; and recommended that the Division explore possibilities in this field in co-operation with the United Nations Department of Economic Affairs.

9. Tropical Agriculture and Forestry

To assure the harmonious use of land, the security of the people, and a better standard of living in tropical and subtropical regions, it is essential to bring together the techniques of agriculture, forestry, and grazing management. This will involve the study of such specific problems as:

(a) vegetation changes following clearing and cropping;
(b) effects of grazing on forests;
(c) range management methods;
(d) improved utilization of grasses and other forage;
(e) watershed protection and irrigation control; and
(f) social problems.

In order to secure prompt action, the Conference recommended that the Director-General convene an international meeting of governments on land utilization in tropical and subtropical regions, which could define the specific problems and apportion the work among research and administrative bodies existing in many of the countries.

The Conference Made Genuine Progress

The Fourth Session of the Conference ended on 29 November, after having, in the words of its Chairman, made genuine progress toward achieving the goals of FAO. Continuing the work of earlier Conferences and of the Preparatory Commission on World Food Proposals, the present Conference made substantial additions to what had gone before. In particular, its examination of the program of work for FAO should make that program both more fruitful and more responsive to the wishes of member governments. Greater attention than ever before has been given to integrating the work of the various technical divisions into a unified FAO program, complemented by the programs of other international organizations.

Before closing, the Conference paid tribute to FAO's first Director-General, Sir John Boyd Orr. It reported to him its "belief that the work done here at this session will mark further progress in world co-operation toward the aims for which he has pioneered so long. Those aims are: plenty and lasting peace—abundance for all men of the products of farms, forests, and fisheries, which are essential for life and well-being, and security and prosperity for the producers of these things."

FAO Publications

1948 Yearbook of Forest Products Statistics

The second FAO yearbook of forest products statistics has now been published as a bilingual English/French publication, with a supplement in Spanish.

The year book is issued in accordance with FAO's statistical program for forest products, which was initiated as the result of recommendations of the 1945 and 1946 Sessions of the FAO Conference, held at Quebec and Copenhagen respectively. This program was reviewed in detail by two special international conferences on forest statistics, meeting in Washington and Rome in 1947, and received formal approval from the Third Session of the Conference at Geneva in 1947.

This yearbook contains information for the years 1946 and 1947, obtained from 95 countries and territories in response to a questionnaire distributed in 1948 to both member and nonmember governments. Some supplementary information has been taken from *Quarterly Timber Statistics Bulletin*, issued jointly by FAO and the United Nations Economic Commission for Europe at Geneva, and also from the annual reports of member governments to the Fourth Session of the Conference of FAO, held at Washington in November 1948.

The form of presentation of the statistics is broadly the same as in the 1947 yearbook, although some tables appearing in the earlier volume have been modified or eliminated. The yearbook still has many defects, both as regards coverage and completeness of data. Some countries cannot as yet break down their statistics according to the categories used by FAO. However, the comparability of figures reported is undoubtedly improving.

It is extremely encouraging that more governments are finding it possible to supply information to FAO. In 1949 it is hoped to secure returns more promptly so as to allow an earlier publication date. The furnishing of data to international organizations imposes a heavy burden on national services; and the continuing co-operation of ministries, statistical bureaus, and other official agencies of the various countries indicates the value which governments attach to the issue of this yearbook.

In the 1948 yearbook there are 46 bilingual tables covering output of roundwood; trade in roundwood commodities; production, trade, and consumption of lumber, plywood, sleepers, wood pulp and pulp products. Included are summary tables of exports and imports, both by volume and value, and estimates of total roundwood consumption by countries and of per caput consumption of various commodities. Consumption in these latter calculations is taken to be the sum of roundwood output plus imports minus exports. Trade data for converted products are reduced to terms of roundwood equivalents. It is of course debatable whether this formula affords a realistic indication of consumer consumption, since, among other factors, it disregards changes in stocks. However, as neither stocks data nor actual consumption data are available, the approximations given may be accepted as apparent consumption. The figures may be questionable for some countries but they do serve to indicate the varying levels of consumption which exist between different parts of the world.

The tables are preceded by a summary of conclusions which gives some salient points drawn from the information in the yearbook, which is estimated to cover the following percentages of 1947 world production—roundwood 57 percent, lumber 76 percent, wood pulp 91 percent. Some of these conclusions are summarized below.

WOOD OUTPUT 1947

World output of roundwood in 1947 is estimated at about 1,450 million m^3 (r), weighing approximately 1,000 million metric tons.

Europe and North America together produced 45 percent of the world's output of wood, although they possess only 29 percent of the world's accessible productive forest. Latin America and Africa, which have 34 percent of the world's accessible productive forest, apparently produced only 15 percent of the wood output.

Region	1947 Output		Accessible productive forest area*	
	Million m3(r)	*Percent*	*Million ha.*	*Percent*
North America	366	25	298	21
S. and E. Asia	300	21	164	12
Europe	287	20	114	8
U.S.S.R.	250	17	310	22
Latin America	170	12	343	24
Africa	50	3	144	10
Oceania	19	1	24	2
Near East and North Africa	12	1	16	1
Total	1454	100	1413	100

*Based on data contained in FAO report "Forest Resources of the World," Unasylva, Vol. II, No. 4, 1948.

Broadleaved wood (hardwoods) and coniferous wood (softwoods) make up nearly equal proportions of the total roundwood output.

By categories, the distribution of the roundwood output of *reporting countries* for 1947 is as follows:

Category	Reported 1947 output	
	Million m3(r)	*Percent*
Sawlogs and veneer logs	315.5	38
Pulpwood	97.0	12
Pitprops	22.7	3
Hewn sleepers	8.3	1
Poles, piling and posts	18.5	2
Fuelwood*	369.5	44
Total	831.5	100

*Including wood for charcoal and distillation. More complete information would probably reveal fuelwood to make up about 57 percent of total forest output.

WOOD IN THE WORLD ECONOMY

By weight the wood produced ranks second only to coal. In value, annual output of the forest seemingly equals 20 to 25 percent of the world's food production.

The relative importance of wood in the world economy is indicated by the following figures, which cover total output *outside the U.S.S.R.*

Commodity	1947 Output	Approx. Value
	Million m. t.	*Million dollars*
Wood	840	11,500
Coal	1,222	.....
Crude petroleum	383	.....
Steel ingots and castings	121	.....
Grain*	474	41,000
Fibers†	9	7,200

Sources: United Nations Statistical Office and FAO statistics.

*Wheat, rye, barley, oats, maize, and rice (rough).

†Cotton, wool, jute, hard fibers, hemp, flax, silk.

WOOD CONSUMPTION 1947

Wood consumption by regions approximates the figures already shown for output.

North America, Europe, and Oceania, with 24 percent of the world's population, consume 70 percent of total industrial wood production. In other regions the emphasis is rather on wood for use as fuel, yet in South and East Asia there is an over-all chronic shortage of fuelwood.

In North America wood consumption per person is higher than in any other region, apparently about three times the rate of Europe.

Region	Per caput wood consumption: Total roundwood	Industrial wood	Fuelwood†
	Kilograms per caput		
N. America....	1600	1270	330
Oceania	1410	810	600
Latin America	920	80	840
Europe	550	305	245
Africa	255	45	210
South and East Asia	165	90	75
Near East and N. Africa‡..	120	8	125
AVERAGE ..	*605	350	255

†Including wood for charcoal and distillation.

‡Figures are inconsistent, being based on inadequate coverage.

*0.87 m^3.

This table is based on conditions in countries for which calculations of consumption could be made. Since many other countries with large populations have, on the whole, low rates of consumption, a nearer estimate of average wood consumption for the world would be 430 kilograms or 0.61 cubic meters per person.

TRENDS IN OUTPUT AND CONSUMPTION

The estimated world output of roundwood for 1947 is about 3 percent greater than the estimate of 1,410 million $m^3(r)$ for 1946. It is still approximately 3 percent below the 1937 output, estimated at 1,500 million $m^3(r)$. Since world population has increased by about 200 millions in these 10 years, per caput wood supplies are now 14 percent below prewar.

For 1947, most regions show a significant increase in output of industrial wood, amounting in aggregate to a 7 percent rise over the previous year. In many parts of the world this has been accompanied by a decrease in fuelwood output.

Need for higher production and consumption

No accurate statement is at present possible as to the rate of wood consumption which may represent a reasonable standard of living. Such an estimate requires intensive studies in a variety of countries, which FAO is planning to undertake.

In prewar Europe, consumption in industrialized countries stood at about 700 kilograms or one cubic meter of wood per person (40 percent fuelwood, 60 percent industrial wood). At the same time consumption in the United States of America was around 1,750 kilograms or 2.5 cubic meters per person (30 percent fuelwood, 70 percent industrial wood). Accepting these figures as the present range for adequate consumption, there is obviously a need in many countries and continents for a substantial rise in the consumption of wood in all its forms. This need is greatest in the Far East and the Near East, but it exists also in heavily forested regions, such as Latin America and Eastern Europe, where low incomes keep wood consumption down.

The current volume of wood output cannot fill present needs and even less prospective requirements since the world's population is increasing at the rate of about one percent yearly. Forest output must therefore be expanded.

Given reasonably good forest management, the forests of the world can be caused to produce sustained yields of wood sufficient for a world population larger than the present one, but this in turn cannot happen unless permanent markets are assured for increasing supplies of forest products.

WORLD TRADE

Wood entering into international trade is estimated at between 6 and 7 percent of world output in 1947. Calculated only on reported volumes of output and trade, the proportion amounts to between 10 and 11 percent.

Recorded data for 1947 show the following groupings:

Net exporting	*Net importing*
North America	Europe (net exporting in 1946)
South and East Asia	Near East and North Africa
	Africa
	Oceania

In Latin America, imports are approximately in balance with exports.

EXPORTS

Total exports reported for 1947 amount to 90 million $m^3(r)$, in terms of solid volume of roundwood, with an estimated value of 2,600 million dollars.

This value may be broken down by categories as follows:

	Percent
Roundwood (sawlogs, veneer logs, pulpwood, pitprops, etc.)	7
Processed wood (lumber, plywood, sleepers, etc.)	35
Wood pulp and pulp products	58

Thus, wood pulp and pulp products account for nearly two-thirds of the value of all exports. Coniferous (softwood) lumber makes up about 22 percent.

Canada is the world's largest exporter of forest products, and its chief market is the United States.

Canada, Newfoundland, and the United States, with Norway, Sweden, and Finland, together export around 80 percent of all the lumber reported, and practically all of the pulpwood, wood pulp, and newsprint.

Export trends

The total volume of exports of forest products reported for 1947 is 25 percent greater than the corresponding figure for 1946.

The major exporting countries increased their exports in 1947 by the following percentages compared with the previous year:

	Percent
United States	+91
Finland	+ 27
Canada	+ 17
Sweden	+ 2

The reported value of all exports in 1947 shows an increase of 50 percent over the 1946 figure, twice the increase in volume, which is indicative of continuing upward trends in prices.

Lumber exports reported for 1947 increased by 37 percent over the 1946 quantity, and wood pulp exports by 15 percent.

IMPORTS

On a world basis, the quantity of imports should obviously equal exports although reported figures never match. The volume reported for 1947 amounts to 82.5 million $m^3(r)$, in roundwood equivalents, which equals a coverage of 92 percent of recorded exports.

The approximate distribution of imports by regions is as follows:

Region	Roundwood	Processed wood	Wood pulp and pulp products
	Percent	*Percent*	*Percent*
Europe	55	55	24
N. America....	40	20	62
Latin America	*	8	7
Oceania	*	4	3
Other regions	5	13	4

*Less than ½ percent.

By value, the United States (784 million dollars) and the United Kingdom (697 million dollars) together account for 68 percent of all imports of forest products reported in 1947.

Import trends

The record of 1947 imports by regions shows that volumes increased by the following proportions over 1946:

	Percent
Europe	+49
Oceania	+46
Near East and North Africa	+22
North America	+15
Other regions	+10

LUMBER

PRODUCTION

World production of lumber in 1947 is estimated at about 205 million $m^3(s)$ or 43.9 million standards, approximately 76 percent being coniferous (softwood) lumber.

This is an increase of 8 percent over the 1946 world estimate of 190 million $m^3(s)$ or 40.7 million standards. Much of the increase is accounted for by expanded production in the United States, Canada, Japan, and Western Germany. In 1947 these countries turned out over 117 million $m^3(s)$ or 57 percent of all world production. In Sweden, which exports almost 40 percent of its output, production declined by nearly 6 percent between 1946 and 1947, from 5.3 million to 5.0 million $m^3(s)$.

CONSUMPTION

Lumber consumption of reporting countries for 1947 is 144 million $m^3(s)$ or 30.8 million standards, only about 5 percent higher than in 1946, despite unsatisfied needs for lumber in industry, housing, and transportation.

All regions show an increased consumption in 1946 over previous levels except the Near East and North Africa, where additional imports did not offset a considerable decline in production.

Estimates by countries of future needs promise only small rises in the rate of consumption for the next few years.

There is a wide variation between countries in the rates of lumber consumption per person. The following are some

figures for 1947 in cubic meters of sawn wood per person.

Canada	0.62	Czechoslovakia	0.26
U.S.A.	0.60	Chile	0.17
Norway	0.46	France	0.13
Sweden	0.45	United Kingdom	0.13
Finland	0.35	Japan	0.11
Switzerland	0.35	Brazil	0.02

Lumber stocks

Lumber stocks of reporting countries increased by 8.4 million $m^3(s)$ or 1.8 million standards in 1947 over 1946. Some countries drew heavily on stocks in 1946. In Europe stocks were built up in 1947 by limiting consumption, while in North America greater production helped raise depleted stock levels.

World trade in lumber

About 11 percent of the total lumber production reported for 1947 entered international channels of trade.

Nearly 70 percent of this trade took place within or between the world's two principal lumber-consuming regions, North America and Europe.

Exports

The volume of exports reported for 1947 is 17.8 million $m^3(s)$ or 3.8 million standards, made up of 16.1 million $m^3(s)$ or 3.46 million standards of coniferous (softwood) lumber and 1.7 million $m^3(s)$ of broadleaved (hardwood) lumber. The total compares with 13.0 million $m^3(s)$ or 2.8 million standards reported for 1946.

The value of reported 1947 exports is put at 658 million dollars.

About 91 percent of all reported coniferous (softwood) lumber exports for 1947 originated in Canada, the United States, Sweden, Finland, Brazil and western Germany. Of the total exports, 55 percent were directed to European countries, 19 percent to North America, 9 percent to Latin America, and 17 percent to all other destinations.

Imports

With imports of 6.2 million $m^3(s)$ or 1.3 million standards, the United Kingdom continued in 1947 to be the chief lumber importer, followed by the United States (3.1 million $m^3(s)$ or 700,000 standards) and the Netherlands (1.0 million $m^3(s)$ or 200,000 standards).

Europe, Oceania, and the Near East and North Africa are net importing regions for lumber, the other regions being apparently net exporters.

WOOD PULP

Wood pulp production

World production of wood pulp in 1947 is estimated at 26.5 million metric tons.

Figures reported to FAO total 24.2 million tons, made up of 33 percent mechanical pulp, 30 percent sulphite pulp, 29 percent sulphate pulp, and 8 percent all other grades.

The principal wood pulp producing countries are the United States, Canada, Sweden, and Finland, which together turn out 82 percent of total world production.

The 1947 estimate of world production is 9 percent greater than the total of 24.3 million tons calculated for 1946 and higher than any previous figure recorded. Yet there exist pulp shortages throughout many parts of the world, and supplies of pulp products, particularly newsprint, are far from adequate to meet real needs. This is in the main due to uneven distribution of available supplies and to the fact that manufacturing capacity in some deficit areas is lying idle or is not fully utilized. In some countries, lack of fuel and power in 1947 was a factor in keeping pulp production levels below productive capacity.

Consumption of wood pulp

Consumption by individual countries has changed significantly since 1937, as is shown by the following figures:

	Percentage Increase 1947 versus 1937
	Percent
Australia	+275
Mexico	+140
United States	+ 62
Canada	+ 30
Sweden	+ 20

	Percentage Decrease 1947 versus 1937
	Percent
Norway	— 6
Finland	—13
France	—26
United Kingdom	[illegible]
Japan	[illegible]

Consumption per person in the United States increased from 81 kilograms in 1937 to 114 kilograms in 1947. Considerable decreases are noted over the same period in other countries. In the United Kingdom, for instance, consumption declined from 64 to 26 kilograms per person.

Pulp products represent most of the paper needed for public records, dissemination of news, educational purposes, packaging, raw material for the rayon industry, and fiberboards for building. Shortages, therefore, constitute a serious hindrance to economic recovery.

Present variations in wood pulp consumption levels are due in the main to factors capable of sudden change. Few countries are prepared to forecast future requirements.

World trade in wood pulp

Exports of wood pulp reported for 1947 total 4.5 million tons, about 17 percent of production, as compared with 3.9 million tons in 1946. The increased exports were directed mainly to the United States. In 1937 total exports amounted to 6.4 million tons.

The largest portion of 1947 exports, 2.8 million tons, came from European sources, namely Sweden (1.8 million tons), Finland (73,000 tons) and Norway (24,000 tons). Canada provided 1.7 million tons of exports.

The United States is the largest importer of wood pulp followed by the United Kingdom.

News of the World

The items appearing here are condensed selections of news thought to be of interest to readers of UNASYLVA. *They are grouped alphabetically by countries under headings currently used by the Division of Forestry and Forest Products for reference purposes. The Editor will be glad to receive direct from readers authenticated items of interest and news value for this part of the review.*

General

ARGENTINA

• The second major congress of the Federation of Associations of Forestry Industry Producers of the Argentine Republic was opened 9 October 1948 at Santiago del Estero. Among the questions discussed were the following: 1) The production of new, improved types of fuel; 2) problems relating to the quebracho tree; 3) reforestation and afforestation, means of facilitating action on the part of private owners; 4) the proposed establishment of an Institute of Forest Technology; 5) measures for the improvement of living conditions for forest workers and their families.

DENMARK

• The Danish Forestry Society and the Directorate of State Forests in Denmark have established an instruction school for forest workers. Forest owners pay the transportation expenses and the normal salary for workers attending the school, while the Government provides lodging and instructors. Each course is of about one month duration.

FINLAND

• An institute of forest genetics has been founded to promote specialized studies in this field. The institute will base its work on experience acquired in North America, Denmark, and Sweden. A forest survey will be made to locate selected trees and stands from which seeds can be collected. The necessary personnel, buildings, and nurseries have already been placed at the disposal of the new organization. The institute is to be directed by a committee including the Director of State Forests, agricultural experts, sawmill managers, plywood and paper manufacturers, etc.

HUNGARY

• The forest area of Hungary, which covers 10 percent of the total area of the country, amounts to 1.2 million hectares. Up to now 74 percent of the forests have been nationalized, while the remainder belongs either to communities or to private individuals. The responsibility for the exploitation, reforestation, and cultivation of these forests is entrusted to a company (Mallerd) which still enjoys some autonomy although it belongs to the State. During the war, Hungarian forests were seriously overcut. Normally, cutting should not exceed 1.5 million m^3 (r), of which 6 percent are softwoods, 31 percent oak, and 63 percent beech and other hardwoods. During 1944 and 1945 9 million m^3 (r) were cut; in 1947 it appears that 3.7 million m^3 (r) were cut of which 0.9 million m^3 (r) were for lumber and 2.8 million m^3 (r) for firewood. Present-day requirements are said to amount to 6.7 million m^3 (r), one-half of which is lumber.

MADAGASCAR

• The Division of Forestry Education has been created as a part of the Central Service of Waters and Forests at Tananarive. Among other responsibilities, this division is entrusted with the direction of the forestry school at Angavokely, where students are admitted after a competitive examination; 10 to 15 students graduate each year. After their final examination these students are qualified as forest rangers. The course, which takes one year, includes seven months of field training in the forests on the eastern coast.

RUMANIA

• The Institute of Forestry Research in Rumania, founded in 1933, has had a revised constitution since 5 June 1947. Under a new law, the Institute has been reorganized and its scope enlarged to include science, education and propaganda, administration, and co-operation with agriculture. It has been divided into eight scientific divisions: silviculture and exploitation; botany, ecology, genetics, and pathology; protection of forests and game; forest pedology; forest management; technology and industrial use of wood and other forest products; construction and logging; forest policies, economics and administration, and research programs. These divisions are further subdivided and have the necessary laboratories. The Institute has six forest experiment stations in various parts of the country on different kinds of land—steppe, plain, hilly, and mountainous regions.

SWEDEN

• The Swedish Forestry Association is planning a series of radio broadcasts in order to get more people interested in forestry matters, to bring about a better recognition of the importance of forestry problems in relation to the whole economy of the country, and thereby to influence the Government's forestry policy. This is also a way to reach small forest owners, who by this kind of education may be brought to realize what improved silvicultural methods can do for their forest property.

TRINIDAD

• The Conservator of Forests, Forest Department, Port of Spain, Trinidad, has provided some further information which supersedes that appearing in the *National Situations* report contained in UNASYLVA, Vol. II, No. 1. He reports that state forests cover 247,000 hectares, of which only about 1,200, in the catchment area of a large reservoir, are closed to exploitation. The 14,206 hectares referred to in the earlier report as a 'national domain where no exploitation is allowed' undoubtedly comprise the lands leased to the U.S.A. for 99 years as a defense base. The fate of these lands rests in the hands of the U. S. authorities and the decision whether or not to exploit these forests is their responsibility. Inevitably, a good deal of the forest had to be cut when the bases were built.

The quantity of timber processed in the sawmills in 1945 was 36,350 cubic meters. The amount of timber handsawn in the state forests in 1945 was only 60,152 cubic feet (say 1,700 cubic meters). Pitsawing is almost dead in Trinidad, having been killed by the advent of numerous sawmills. A considerable volume of wood is annually hewn and used in the round. Imports in 1945 amounted to 1,178,800 cubic feet.

While it is true that the natural forests contain a considerable number of species with inferior timbers suitable only for fuel, Trinidad is perhaps more fortunate than many Latin American countries in being able to provide an increasing market for many of even the less durable species. Developments in crate and packing case manufacture, for example, promise a market for such usually unsalable species as *Spondias monbin* and *Pachira insignis*. The policy of the Forest Department in the past has been to concentrate regeneration operations—but not exploitation—in a limited number of forests where abundant natural regeneration of the more valuable species could be obtained at low cost and where future exploitation would be inexpensive. Similarly, the teak plantations are formed on areas of suitable soil where extraction is simple. Now that the demand for erstwhile unsalable species is rising it is planned to bring all the forests under controlled exploitation and systematic regeneration.

UNITED KINGDOM

• The first year of the 50-year plan, at the end of which Great Britain expects to possess 2 million hectares (5 million acres) under forests, showed the following results: An increase in forest area from 573,000 hectares (1,415,000 acres) to 583,000 hectares (1,441,000 acres). Area planted or reforested 10,700 hectares (26,400 acres), including 3,600 hectares (8,900 acres) in England, 5,000 hectares (12,400 acres) in Scotland, 2,100 hectares (5,100 acres) in Wales; for this purpose 54 million young trees were used, all produced by the nurseries of the Forestry Commission. The nursery area was increased by 70 hectares (173 acres) and now totals 749 hectares (1,850 acres) with 338 million seedlings and 119 million transplants. Three new forestry schools have been opened. The Alice Holt Lodge Forest Research Station in Surrey began functioning, with divisions of silviculture, forest management, pathology, forest entomology, and a bibliographical section. The number of workers employed by the Forestry Commission increased from 6,700 in October 1946 to 10,500 in October 1947. Receipts totaled £5.5 million, and expenditures £3.9 million, leaving a credit balance of £1.6 million. The Commission has now at its disposal an amount of £3.7 million, as it already had a previous credit balance of £2.1 million at the beginning of the fiscal year.

UNION OF SOVIET SOCIALIST REPUBLICS

• The belief that forests have only a minor influence upon climate is contested by Russian scientists. Their opinion is based on observations made over vast areas of European Russia and Siberia, as well as over the equally wide steppe regions. Measurements taken in a wooded area of 80,000 hectares in the province of Sumara have indicated an average annual rainfall of 475 millimeters, whereas this rainfall was reduced to 387 millimeters at 80 to 90 kilometers west of these forests, 248 millimeters at from 70 to 80 kilometers to the east, 336 millimeters at 60 kilometers to the north and 275 millimeters at from 40 to 50 kilometers south of these forests.

Because evaporation in forest areas is much greater than that from any other mass of vegetation, even greater than that of swampy regions or bodies of water, large scale plans have been prepared to increase the area of forests in the marshy or sparsely wooded regions of the north. Extensive drainage and canalization are planned, as well as afforestation and reforestation. It is hoped that these will increase evaporation and that the moisture will be blown towards the dry steppes. Rainfall in these areas would thus increase and considerably improve the fertility of the soil. Russian scientists argue that since the climate of the steppes has deteriorated because of intensive deforestation in the North, this trend would be reversed and the climate would benefit from the effects of intensive reforestation. The deterioration of the climate in the south was evidenced by increases in variations of temperature, by protracted droughts, sandstorms, decrease of the water level in summer floods, the silting up of river beds and estuary ports. Silting is a major obstruction to navigation on the great Russian rivers. These circumstances led to the passing of a law on watershed protection in 1936. It provides that strips of land 20 kilometers wide along the upper course, 6 kilometers wide on the middle course, and 4 kilometers wide along the lower course must be protected along river banks. The forests located in this zone, covering 69 million hectares, are protected by special provisions prohibiting any cutting not primarily intended for the improvement or growth of the forest stands.

Fundamental Science

UNITED STATES OF AMERICA

• In a series of four lectures at the West Coast Technical Association of the Pulp and Paper Industry (TAPPI) seminar, Prof. Holger Erdtman started with a general discussion of the methods of elucidating the structure of polymeric materials and showed their possible application to the lignin structure problem. The general conclusion that may now be reached regarding lignin structure is that it is a building unit consisting of a benzene ring with a three-carbon side chain. The biggest handicap lignin chemists face in their experimental work is the difficulty of obtaining an isolated lignin that has not undergone chemical change during its isolation. The study of the lignin molecule has been aided by experimentation with closely related materials of known structure, and some simple aromatic compounds that are thought to resemble chemically the building units of lignin.

In the second lecture, the sulfonation of lignin was discussed. This reaction takes place during a sulfite cook and is one of the most characteristic lignin reactions.

The difficulty experienced in pulping the heartwood of pines by the sulphite process was the subject of the third session. Dr. Erdtman has recently unravelled the mystery of these puzzling phenomena with his discovery of the phenolic compound "pinosylvin" and its derivatives in pine heartwood. He was able to show that these materials, although occurring in small amounts, inhibit the sulphite cooking reaction.

The heartwood of Douglas fir, *Pseudotsuga taxifolia*, is difficult to pulp by the sulphite process due to the presence of another phenolic substance, "taxifolia." In Finland, the ultimate solution to the problem of the sulphite pulping of pines was found in the hand-sorting of heart and sapwood chips under ultraviolet light. Dr. Edrtman concluded with a discussion of other crystalline, identifiable compounds which occur in minute amounts in various woods.

UNION OF SOVIET SOCIALIST REPUBLICS

• Contrary to observations made by other entomologists, Soviet scientists have found that, in the Kovdosk Bay of the White Sea, the marine borer, *Limnoria lignorum*, produces as many as 12 to 20 (sometimes 25) eggs per female at a temperature as low as 8 to 10° C. The salinity of the water in the bay, however, is too low for the borer to attack piles and other submarine structures. Here it lives in the more saline water at greater depths (7 to 9 meters), feeding on the sunken waste from sawmills in the vicinity. It is feared that attacks may spread from these areas to marine wooden structures in places where salinity is higher.

Silviculture and Management

CANADA

• Ontario's Department of Lands and Forests distributed nearly 20 million seedlings for reforestation purposes in Ontario during 1948. It has been estimated that nearly 15,500 km^2 (6,000 sq. mi.) of southern Ontario requires reforestation, and the provincial nurseries are hard-pressed to supply the demand from farmers, service organizations, and private individuals. Chief bottleneck is in obtaining seed for the nurseries, and the department is now using every known modern method of obtaining it. Work on reseeding of burned-over areas is still proceeding, with "pelleting" in full swing. Pelleted seeds are coated with minerals and other substances, and are sown from the air after the first snowfall in November. However, forestry experts point out that in the north sufficient seed trees remain to reseed areas cut or burned over, and that planting of a tree for every one cut down or burned would be wasteful and inefficient.

PUERTO RICO

• Between January 1934 and June 1945 more than 2,300 hectares (5,800 acres) have been reforested. Seven million plants and 28,800 kilograms (63,600 pounds) of seeds of 30 different species were used. A general survey of the results obtained on the restocked areas was carried out recently. These operations were carried out on sites of very varied quality, including areas which had suffered considerably from erosion. The degree of soil erosion was in fact an essential factor in the success of this reforestation work. The rate of survival was low since, despite the considerable protection which natural regeneration afforded to the sowings and to the artificial plantations, only 60 percent of the area planted can now be considered completely restocked while 23 percent is only partly reforested and requires additional young trees in the gaps. The cost of these operations was very high, averaging US $67 per hectare ($27.12 per acre) for the initial planting, $18 per hectare ($7.33 per acre) for the cost of replacements and of filling gaps after the first planting, plus $80 per hectare ($32.33 per acre) for weeding, clearing, vine removing, etc. One of the most important causes of high costs and partial failures was the lack of experience of the workers employed to do the planting during the first few years; but there is no doubt that the most serious cause has been the lack of knowledge as to the ecological conditions necessary for the survival of the various species planted. However, thanks to research and to the experience acquired since, much lower costs can be expected in future.

Clearing of the abundant vines and weeds will continue to require the expenditure of large sums of money. Natural regeneration can be relied upon in these

forests. Research on methods suitable to bring this about is to be developed and, if the costs of artificial regeneration cannot be kept sufficiently low, the aim is to establish mixed stands of varying ages which would make natural regeneration very much easier. In many cases, in areas where restocking is necessary, it has been found that instead of initiating plantation with precious and valuable species, it was preferable to start with robust pioneering types such as the roble, *Tabebuia pallida,* and the maria, *Calophyllum calaba,* which will form a cover under which the more valuable species can be introduced later. These two species and some types of eucalyptus have given the best results on the more difficult sites. In better soils, however, the best species have proved to be the ausubo, *Mimusops nitida,* one of the best lumber-producing trees on the island, and then, according to circumstances, the capa prieto, *Cardia alliodora,* the capa blanco, *Petitia domingensis,* which were successful even on poor lands, the pacana, *Lucuma multiflora,* and the nuez moscada, *Ocotea moschata.* On open ground, it is advisable to space the trees closely, i.e., at a maximum distance of 1.50 to 2.50 meters, to produce a cloud canopy as rapidly as possible. Under cover, spacing can vary from 3 to 7.50 meters. The whole area of Puerto Rico only allows for a ratio of 0.4 hectares (one acre) per inhabitant and only half of this can be under permanent cultivation, so that reforestation is important. Existing forests, however, are insufficient to meet domestic requirements.

NETHERLANDS

• Of a total area of 3,480,000 hectares in Holland, forests cover only 258,000 hectares, or 7.4 percent. During the war, to meet the fuel shortage, 30,000 hectares were cut down, so that in 1945 the forest area was reduced to 228,000 hectares. However, by the end of 1947 approximately 10,000 hectares had been restocked and the trees bordering the streets and avenues had been replanted. Trees along highways, which constitute an area of 30,000 hectares, or approximately 12 percent of the wooded area, represent a considerable proportion of the country's supply.

UNITED STATES OF AMERICA

• The Southern Forest Experiment Station at New Orleans (Louisiana) has published a brief report on the use of mechanical tree-planters. In 1948, this station made a comparison between a plot of slash pine, *Pinus caribaea,* and another of longleaf pine, *Pinus palustris,* on which trees had been planted both by hand and by machine. The rate of survival, which was comparatively poor for the slash pine as it had suffered from grazing cattle, was found to be 68 percent for trees planted by machine and 52 percent for trees planted by hand. Figures for the longleaf pine show that 86 percent of the trees which had been planted by machine had survived, compared with 89 percent of those planted by hand.

• The Forest Fire Commission of the Southern States has tried for several years to acclimatize the redwood, *Sequoia sempervirens,* in that part of the country. Some trees which were planted about thirty years ago in Virginia have grown vigorously, and there are some fine examples of century old trees in South Carolina. The growth of redwood in these regions seems superior to that of any indigenous species except poplar. To enable these experiments to be continued the Commission has recently imported from California 3,000 sequoia seedlings to be distributed in small numbers among the members of the Commission as well as among schools and colleges in the Southern States.

Forest Protection

CZECHOSLOVAKIA

• Natural enemies of the insect attacking forest trees often play an important role in keeping such infestations in check. A case in point was the outbreak of the green oak roller, *Tortrix viridana,* in Bohemia and Moravia in 1940-45 which caused much damage to oak forests. Two bugs of the genus *Calocoris* and *Cyllocoris* (family *Miridae*) were found to be very efficient destroyers of this insect. They feed voraciously on the caterpillars of the green oak roller and in some places destroyed as much as 40 percent of them. This natural control proved very effective in preventing the infestation from becoming epidemic.

ITALY

• An Italian scientist has developed a new means of combating the processionary moth, *Thaumethopoea pityocampa Schiff,* which attacks pine trees, and which often causes serious damage in Western and Southern Europe. He uses a solution of from 5 to 10 percent of paradichlorobenzene dissolved in gasoline. To collect and destroy the cocoons of this moth by hand may be practicable on very young stands, but it becomes extremely costly on older stands. The low price and ease of application of the new method should make it particularly valuable in combating this caterpillar.

UNITED STATES OF AMERICA

• One of the most important results of the Forest Pest Control Act of 1947 has been the improvement of methods for combating the spruce budworm, *Cacoecia fumiferana,* which infests at present more than 400,000 hectares (990,000 acres) of mixed stands of true fir, *Abies* spp., and Douglas fir, *Pseudotsuga taxifolia,* in the States of Oregon and Washington. Experimental sprayings with DDT in a solution of fuel oil in proportions of about 1 kilogram per 9 liters per hectare (one pound of DDT to one gallon of fuel oil per acre) from airplanes and helicopters, between mid-June and the beginning of July, just before the worms emerge from their cocoons in the crevices of the tree trunks, proved to be particularly effective, killing 95 percent of the insects. Similar experiments were carried out against the mountain pine beetle, *Dendroctonus monticolae,* in southeastern Idaho and western Wyoming These tests involved the spraying of the trunks of standing trees from the ground with chemicals capable of penetrating through the bark. Two sprays were used, orthodichlorobenzene and benzene hexachloride diluted in fuel oil. The operation was carried out from the beginning of May to the beginning of July and seems to have given good results, although a positive check has not been made. Experiments were also carried out against the Black Hills beetle, *Dendroctonus ponderosae,* in South Dakota. The recent attack of this beetle was the worst of its kind since the disastrous epidemic early in the century, which destroyed great quantities of ponderosa pine.

Logging and Engineering

CZECHOSLOVAKIA

• Two types of cable hauling systems known as "Wyssen" and "Lasso Kabel" were imported in 1946 from Switzerland into Czechoslovakia and are now being used with satisfactory results in logging operations on the State forests. Use of this equipment was found not to cause any damage to the remaining forest and is compatible with intensive silvicultural practices. The Czech foresters, on the basis of experience, have developed mathematical formulae by which they determine under what conditions such mechanized logging operations give the best results both economically and silviculturally.

UNION OF SOVIET SOCIALIST REPUBLICS

• The Central Timber-floating Research Institute studied floating losses over a distance of 300 kilometers on the Pola River in the northern Novgorod Province. The timber was in the water for an average of 72 days, and consisted of 31.5 percent Scots pine, *Pinus sylvestris,* and Norway spruce, *Picea abies, sawlogs,* 16.4 percent small-sized logs of the same species, 11.5 percent birch, aspen, and alder sawlogs, and 40.6 percent fuelwood of the latter three species. Eighty percent (by volume) of all the timber sinks at the booms. The jams occurring there push many logs under the water; they become water-logged and sink. The loss of birch logs cut in March and April and floated the same spring amounted to 75 percent, but when kept until the following spring before floating, the loss through sinking was only 12 percent. When the trees were cut in summer or early autumn and allowed to remain with their crowns for three days before trimming, the specific gravity of the wood was reduced, through transpiration, by 14 percent. Logs cut from such trees and floated next spring gave a sinkage loss of only 2 percent. This method of cutting logs is recommended for all hardwoods except those which, when cut in the spring or early summer, develop a brown stain. These should be logged only in late summer or autumn. Unbarked small spruce and pine timber was 14 times as liable to sink as similar logs barked and seasoned before floating. Fuelwood with decay gave three times as much sinking as undecayed. Round fuelwood of deciduous species with decay showed a sinkage loss nine times as great as that without decay, but if split in half or quarter logs, only two to four times as much. The Siberian Forest Institute, which studied the sinkage of larch sawlogs in floating, found that if the logs are completely barked the loss amounts to less than 1 percent, but if

the trees are girdled before being cut the loss is as little as 0.27 percent. Of course, the suitability of the river for floating, the presence of improvement works, and so forth, may account to some extent for the difference in the losses through sinkage.

• By 1950, some 61 million m^3 (r) of timber is to be floated annually. To take care of such a large volume, the total length of floatable waterways is to be increased from 105,000 to 220,000 km. Extensive river improvement work is now under way. The existing waterways are classified into five groups according to the degree of improvement required.

Conversion

United Kingdom

• A completely new design of plant for the continuous production of compressed sawdust board and core material has recently been demonstrated to technical experts. Radio high frequency waves, infrared heat waves and electro-magnetic vibrations are some of the devices incorporated in the plant. Sawdust and resin are fed into a hopper, mixed, heated to a specific temperature by radio waves, and then passed under pressure while the temperature is maintained by infrared waves. A continuous length of hardboard emerges and passes on to a metal table where it is automatically cut into whatever length is required. The thickness of the board ranges between 6.4 mm and 19.1 mm (¼ in. and ¾ in.) and a maximum width of 1.2 m (4 ft.) is allowed for. The speed is 30 to 60 centimeters (one to two ft.) per minute, equivalent to 2.4 meters (8 ft.) per minute when produced in quantity. The manufacturers claim that six of these plants, forming a small production unit, can with very little supervision produce during 24 hours (in three 8-hour shifts) about 21 kilometers (13 mi.) of board. Experiments have been carried out during recent months with waste materials sent from different countries to determine their usefulness. Sawdust has been received from the west coast of America (fir trees), Texas and Los Angeles (redwood), Oregon (pine), and even rice husks from Egypt. The task has been to determine the amount of resin, heating and other factors required to secure success with these materials. Regarding surface finishes, the board can be finished with paint or distemper, printed designs, wood veneers, sheet metal, laminates, resins or fabrics. Principal industries in which this board can be used are building, furniture, shipbuilding, railway coach building, road transport and aircraft. A feature of the machinery is that no presses are used. The plant cost about £15,000 to build.

Union of Soviet Socialist Republics

• Enormous quantities of wood are still being used as fuel in many industrial plants of the country. This wood for the most part is poorly seasoned. It was determined that on the average the wood contained some 55 percent moisture. The use of improperly seasoned wood necessitates burning one and a half times more wood each year than if the wood were dry. By using seasoned wood, the volume of fuelwood cut each year could be reduced by 23 percent, thus releasing some 9.6 million man hours for other work; the burden on transportation could be halved; and other economies could be effected. To obtain fuelwood that contains only 20 percent moisture, it is necessary to dry the wood under natural conditions in a shed for one year; thus each plant would require an additional year's supply of wood on hand. Since the lumber industry does not fulfill its annual quota, it would be impossible to double in one year the yearly requirements of the plants. It is proposed, therefore, to accomplish this gradually by adding each year for the next five years, 8.5 percent above the annual requirements of the plant. In this way a reserve of dry wood equivalent to one year's supply will ultimately be available.

• A Russian scientist, S. B. Henel, has experimented with impregnating wood with aromatic amins, which, he claims, may open new theoretical and practical methods of reducing its hygroscopicity. The amins used were alpha-naphtylamine, beta-naphtylamine, and diphenylamine. Beech and birchwood were used in the experiments. Samples of the wood were submerged in the amins for one hour at a temperature of 130° C. The best results were obtained from betanaphtylamine. The conclusions reached were that permeating the wood of beech and birch with beta-naphtylamine reduces the moisture-absorbing capacity of the wood, by varying the conditions of experiments, to 5 and 13 percent as against 14 and 22.5 percent of the untreated wood, while the water-holding capacity is reduced to 32 percent as against 150 percent in the untreated wood; the volumetric distention due to moisture absorption is reduced 7 to 10 times and the linear distention 3 to 5 times; that impregnation of the wood with aromatic amins makes it entirely resistant to fungi; that the mechanical qualities of the wood are considerably increased; and that for these reasons the impregnation of the wood with betanaphtylamine is a very efficacious method of reducing the hygroscopicity of wood.

Utilization

Canada

• Possibility of manufacture of protein-rich feeds out of sulphite liquors from pulp plants is being studied by the British Columbia Research Council which has a highly trained staff working on every phase of industrial development. Numerous projects are now being studied, although progress on many is necessarily slow. Economic problems remain to be mastered in connection with the possible conversion of the sulphite liquors.

Norway

• A new product, whose trade name is Sagolit, has appeared on the Norweginn market. It is manufactured from sawdust and other wood waste by a special patented process. The waste is treated chemically and mechanically and the finished product is obtained by pressure at a very high temperature. It can be worked with the usual cabinet maker's tools. Sagolit can be used either for inside panelling or exterior roofing. It has a smooth shiny surface and is impervious to humidity. Two factories have already begun manufacturing it and others are remodeling their plant for this purpose.

• The Research Society for Norwegian wood-pulp industry is investigating the possibilities of producing "semi-pulp" from wood waste. Wood waste for such purposes would be available in the form of unbarked tree tops and branches, slabs, etc., comprising any wood not generally considered suitable for sawn timber or for the manufacture of chemical or mechanical pulp, even though waste of this type is being used now by the sulphate pulp mills. The society has authorized a committee to study available methods for the production of "semi-pulp," to calculate estimates, if possible, for a factory of suitable size and to survey the distribution of available wood waste.

Sweden

• A standard export grade for panelled and glazed wood doors, to be effective as from January 1, 1949, has been agreed to jointly by the Swedish Joinery Export Association and the Swedish Joinery Manufacturers' Association.

• Methods of introducing savings in the pulp and paper industries have been discussed in "Svensk Pappers Tidning." In the production of wood pulp and paper the costs of raw materials, especially wood, are predominant. It is therefore of major importance that the losses of wood be kept as low as possible and that the process be conducted so as to obtain maximum yield. Increased use of inferior wood for high grade pulp must be warned against. In the floating and storing of pulpwood several improvements have been introduced in recent years, resulting not only in smaller loss by sinking, decay, etc., but also in better average quality of the wood. Due to shortage of labor in the forests, it has become necessary to float logs in unbarked condition in certain districts. This is dangerous for sulphite pulpwood, as the surface layer gets impregnated by tanning substances which prevent it from becoming properly cooked, thereby causing considerable loss. Changing over from knife barkers to barking drums in the mills has resulted in pulpwood savings from 10 to 15 percent; few Swedish mills still use the old method. It is pointed out, however, that the possibilities of getting clean unbleached sulphite pulp are somewhat reduced when the surface of the log is not removed. Other types of barking machines are mentioned, for instance hydraulic barkers. Thorough wetting of the logs before friction barking considerably facilitates the removal of the bark. Modern chippers give uniform chips and smaller loss in screening and cooking. In the pulping processes, the possibilities of increasing the yield without altering the pulp quality are very limited. A certain loss of short

fibers passing through thickeners, wires, etc. ought to be allowed, because these fibers consist mainly of medullary ray fibers of low color and very high resin content. Several pulp mills have special equipment for screening out such fibers, thus achieving improvement in quality both for paper pulp and dissolving pulp. Manufacturers of rayon pulp should not be too keen on trying to improve the analyses of their grades beyond what is demanded by the customer, because this would unnecessarily increase production costs and in the long run force prices upward. Another trend that should be avoided is the demand for rayon pulp with low viscosity. Making such grades means a considerable loss in yield and production capacity in the pulping process, which sooner or later will be reflected in price. It is in most cases better economy for a viscose mill to make the necessary degradation by sufficient aging of the alkali cellulose, which can be done without such loss in yield and also furnishes a cellulose with smaller polydispersity. Other raw materials are sulphur, pyrites, limestone, sodium, sulphate and lime. Burning of pyrites gives generally a better economy than sulphur, and some Swedish sulphite pulp mills have recently installed Nichols-Freeman's furnaces for this purpose. The consumption of sodium sulphate has been considerably reduced at such sulphate mills which have installed Tomlinson or similar furnaces with Cottrell precipitators for their black liquor burning and also modern control instruments. Great savings in the consumption of chlorine and bleaching powder have accompanied the very important development in bleaching techniques which has taken place since 1930. Almost all Swedish mills have now changed over to multistage bleaching, and most of them take in all their chlorine as liquid, transferring part of it to bleach liquor themselves. The Swedish pulp industry lays great emphasis on efficiency, not only on account of present high production costs, but also in view of the prolonged period of severe raw materials shortage. Most mills will have to face reduced supplies of pulpwood for a long time to come, thus enhancing the importance of using every possible means of saving wood. If one percent of Sweden's present pulpwood consumption could be economized, it would represent a direct saving of more than 5 million Swedish kronor.

• A larger quantity of wood for export is expected to result from economies arising from a new lumber-saving design for wooden houses recently announced.

Three years ago H.S.B. and Svenska Trähus, two large producers of prefabricated wooden houses, formed a joint research organization known as H.S.T., which now announces the result of its research concerning the design and erection of such houses. Research has been directed to small houses, mainly with the aim of reducing the quantity of wood used for each dwelling, as well as utilizing for such purposes wood of small dimensions and inferior quality.

United Kingdom

• The rotors of the Airhorse helicopter, the first to be made in Britain with three rotors, are constructed of wood. Each rotor has three blades and every one of the nine blades has been produced as a pure monocoque component. Previously helicopter blades have been fitted with internal ribs, but those on the new machine are built on the egg-shell principle, without ribs, consequently all stresses and constructional details are contained in the outer skin. Each blade consists of 1,500 separate pieces of wood. There are two parts to each blade. The first is a leading edge of Canadian birch laminations, while the second—the skin—consists of Canadian birch with a core of African mahogany of four laminations.

United States of America

• Solving an eighty-year-old problem of the pulp industry, a new process in the manufacture of sulphite wood pulp was announced by the Weyerhaeuser Timber Company. The new method now being used at the Longview, Washington plant allows more complete utilization of Pacific Northwest timber species. Eight buildings with a total floor area of about 4100 m^2 (44,000 sq. ft.) house the apparatus, piping and special equipment for the process, which recovers materials formerly wasted. The development permits the company to recover from waste pulping liquors chemicals used in the production of sulphite pulp and steam and power energy from organic solids in solution. As a result, pollution resulting from waste liquors discharged into steams will be eliminated. Normally, sulphite pulp is processed by cooking wood chips with an acid produced from the action of sulphur dioxide upon limestone, in the presence of water. A ton of waste organic solids is produced as a by-product for every ton of pulp manufactured. Basically, the new process substitutes magnesium oxide for limestone by the use of specially designed equipment. Evaporation and burning of the leftover cooking liquors recovers cooking chemicals in a form which permits their reuse. The organic solids reclaimed will produce enough steam to furnish power for a large part of the recovery and pulping process. This will release sawmill waste wood, heretofore used for fuel in the sulphite mill, as raw material for the production of kraft pulp in Weyerhaeuser's new plant at Longview.

• Using a process developed by a chemical company in Cleveland, Ohio, newsprint made from specially prepared wheat straw is to be run off by the Chemical Paper Manufacturing Co. in Massachusetts. The paper is to be 100 percent straw and is expected to be four times as strong as conventional newsprint. Those who have been working on the process hope it can be made for $70 a ton.

• The pulping of southern New England hardwoods is the subject of a recent bulletin issued by the Northeastern Wood Utilization Council. The Council has been interested in the increased use of hardwood to meet the growing demand for pulp and in this report special emphasis had been placed on the oak-hickory belt, which from a pulpwood standpoint offers a practically untouched supply in New England. Pulping tests on typical mixed hardwoods, consisting of about 70 percent oak and the balance beech, birch, maple and hickory, indicate that they are especially suited for corrugated paper board, the neutral sulphite semi-chemical process being found superior to the sulphate process for this purpose. The finished paper equals or surpasses the properties of kraft paper made from southern pine. The report states that the container board branch of the industry has expanded most heavily of all branches of the industry, apparently without being able to meet the market demand, and it is believed that the potential demand is far from being saturated.

The Council has also given a good deal of attention to charcoal production, as one method of utilizing low-grade wood. Bulletins have been issued on portable cinder block kilns developed by the Connecticut Agricultural Experiment Station, and on the continuous distillation installations which were subsequently developed. The firm of Roth and Strupp in Switzerland has carried out a further development of the distillation unit. This consists of a semi-portable unit, which may be of interest because of the small quantity of wood required and the low investment cost.

• Development of a new, low-cost board that repels rats has been announced by a company which is now producing a material known as Protekwood that promises to reduce substantially the damage by rats to food, property and human life. This new easily-applied laminated board, a combination of hardwood veneer with impregnated fiber facers, is non-poisonous and in no way effects poultry or farm animals.

Recent tests indicated the value of Protekwood. Boxes made of ordinary wood and others made of Protekwood were placed in cages and a farm rat put in each cage. The rats had access to water, but the only food they could get was in the boxes. In every case the rats seeking to get the food from the Protekwood boxes were repelled. The Protekwood boxes were barely scratched by the teeth of the rats. But the rats actively attacked the plain wooden boxes.

Union of Soviet Socialist Republics

• Present rate of dry distillation of hardwood does not keep pace with the increasing demand for acetic acid in USSR, and the expansion of this industry is looked upon as uneconomical because it would entail the use of large quantities of timber too valuable for that purpose. Russian research turned, therefore, to other possible sources of acetic acid, especially to the large potential source offered by the manufacture of industrial gas from wood. A recovery process has now been worked out and introduced into one of the largest wood-gas plants. It was found that by this method, acetic acid can be produced twice as cheaply as by dry distillation of hardwoods, and that high yields can be obtained also from coniferous wood. The gas is dried at the same time as the acetic acid, water, and resins are re-

moved from it. This not only prevents corrosion of metal pipes, but also reduces the consumption of wood for the manufacture of steel in Martin furnaces and increases their productive capacity.

Economics and Statistics

Australia

• Negotiations to arrange for an exchange of exports on a barter basis have been proceeding for some time between the Governments of Australia and the USSR. It is now proposed to exchange trial shipments of wheat, flour and other foodstuffs from Australia, for timber, paper and tinned fish from Russia. It is expected that these items, as well as wool, are most likely to provide a basis for future trade although other items would also be included in the trial shipments. The Australian Trade Commissioner in London has pointed out that Australian manufacturers are anxious to obtain additional supplies of softwoods and paper. Samples of Russian timber and paper have been received in Australia, but the quantities have not been large enough for manufacturers to test them thoroughly for suitability.

Brazil

• A study is being made of the possibilities of establishing a pulp and paper plant in Belem, Brazil. The Guama River, accessible from the plant, will provide transportation facilities for the pulpwood reported to be available from the timberlands in the area. If it is decided to complete the proposed project, it will be the first paper mill in the Amazon region.

British Guiana

• Important proposals for the development of timber extraction and marketing appear in a report issued by the British Guiana and British Honduras Settlement Commission. The report states that an immediate start could be made with a large-scale forest project to extract 85,000 m^3 (3,000,000 cu. ft.) of timber annually from the Bartica triangle and lower Essequibo in British Guiana, combined with a saw mill and veneer-peeling plant. It would employ about 1,000 workers in the jungle and probably 4,000 people in all.

Bulgaria

• Industrial production indices for the wood and paper industries are:

Wood Industry		Paper Industry	
Year	*Index*	*Year*	*Index*
1939	100.0	1939	100.0
1940	115.2	1940	108.6
1941	86.8	1941	145.3
1942	122.8	1942	161.0
1943	113.8	1943	177.7
1944	93.8	1944	103.0
1945	203.1	1945	120.6
1946	304.8	1946	170.1
1947	431.4	1947	182.9

Exports and imports for the following five categories are:

Category	Imports		Exports	
	1947	1946	1947	1946
	(*Metric tons*)			
Joinery and other uses	1,306	292		
Paper industry products	20,159	36,924		
Charcoal			18,022	14,586
Veneer sheets			273	63
Plywood sheets			1,370	1,300

Canada

• Gatineau, Quebec, is today becoming one of the greatest wood utilization centers of the world. It makes Novocell dissolving pulp and bleached pulp for bond and newsprint. Other enterprises in Gatineau are a big Masonite plant, a fiberboard plant, a plywood plant and soon to be operating what is said to be the biggest and most up-to-date sulphite effluent alcohol plant in the world.

• According to *Foreign Trade*, a Canadian government publication, present pulpwood production conditions throughout the Dominion are generally satisfactory. Production in the 1947-48 cutting season was the largest in history, amounting to 28.3 million m^3 (r) (11.1 million cords) in the area east of the Rocky Mountains. An increase of 19 percent over the 1946-47 season is attributed to more favorable weather conditions and adequate labor supply. The total production consisted of 19.6 million m^3 (r) (7.7 million cords) cut by companies on leased Crown lands and their own forest holdings, and 8.7 million m^3 (r) (3.4 million cords) purchased from independent pulpwood producers. As compared with the current seasonal output, the production in 1939-40 amounted to only 16.2 million m^3 (r) (6.35 million cords).

• Waste studies by the Forest Products Laboratories of Canada show that in manufacturing sawlogs into lumber, the following is the percentage breakdown:

	(Douglas Fir)	Spruce,
Green lumber	72.7	49.0
Slabs, trim	12.9	34.4
Sawdust	14.4	16.6

The wide differences in the manufacturing procedure, in the size of the logs and in the size of the average mill between the Douglas fir region of western Canada and the spruce region of eastern Canada, preclude any direct comparison between the results of these waste studies.

Chile

• Through its Corporacion de Fomento de la Produccion, the Chilean Government has recently applied for a loan from the International Bank for Reconstruction and Development to aid in financing a proposed wood pulp mill. The mill is planned to be located at General Cruz, about 48 kilometers (30 miles) south of Chillan and is expected to be completed by 1952. The plant's production capacity is anticipated at 40,000 metric tons annually, of which 30,000 tons will be sulphate pulp.

Cuba

• A new rayon plant is soon to be completed by the Compania Rayonera Cubana S. A.; it is expected to employ 1,200 workers. Production for the first year is to reach 12,000 million pounds of staple fiber and rayon. Around 30 percent of this quantity will be absorbed by the home market; the balance will be exported.

Finland

• The small timber industries of Finland have created their own trade organization, the Co-operative Exporting Center for the Finnish Woodenware Industry. This organization consists of about 782 small and medium-sized factories. It deals both with the purchase of raw materials and the sale of products abroad and on the domestic market. Production includes finished and semi-finished products. Furniture and wood used in the building industry are the most important. The latter include doors, window frames, flooring, and parquet boards.

• The trade agreement between Poland and Finland in March 1948 included, among other things, the delivery of 4,000 prefabricated timber houses to Poland. The houses were shipped from Finnish ports to Gdynia; they were transported by rail to Upper Silesia, where most of them were erected. The building contractors were small firms, capable of erecting 50 to 100 houses in one contract operation. They could be classified into three groups—small private builders, co-operative building enterprises, and nationalized builders.

Within six months approximately 2,400 houses were put up. In 1947 the delivery of the houses lagged behind erection, because of shipping difficulties. In 1948, shipments proceeded according to schedule. Besides skilled labor, pupils of industrial trade schools also participated in the erection work. The simple construction methods used required less labor than for ordinary buildings.

• The agreement of 3 February 1947, regarding the use of former German assets taken over by the Soviet Union, provides for the establishment of a joint Finnish-Soviet rayon factory, to be called Viskoosa Oy. The chairman of the board of management will be appointed by the Soviet Union and the vice-chairman by Finland, while the executive director is appointed by Finland and his deputy by the Soviet Union. Every three years each of these officials will be appointed from the alternate country. It has been agreed that the Viskoosa factory will be erected in Oulu. Using sulphite cellulose as the principal raw material, it will produce artificial fibers and similar products. Production is planned at first to

be about 1,400 or possibly 2,000 tons a year, eventually increasing to 4,000 to 6,000 tons. The labor force, chiefly women, will number some 1,400 to 1,500 at the beginning.

France

• A new plant for the production of fiberboard has been built by the Isorel Company. When this factory goes into operation at Castelljaloux, it will quadruple French production and be able to supply almost the total national requirement in the near future. Defibering of wood shavings is done mechanically under water vapor pressure by a Swedish process. Resins are mixed with the woodpulp. The factory is designed to produce 60 tons of fiberboard daily and to employ 150 workers. The plant will use sawmill waste from Les Landes pines as raw material.

Germany

• Official statistics for the wood industry in the British and American Zones are:

	Number of plants	Number of persons employed
Sawmills	8,066	74,950
Plywood factories	58	6,153
Veneer factories	39	1,557
Fiberboard factories	4	751
Wood trading houses	3,270	26,300
Total	11,437	109,711

The sawmill industry is concentrated primarily in Bavaria, while the plywood and veneer factories are in Rhine provinces. Damage caused by the war appears to have been repaired and the industry has been restored to prewar capacity. However, raw materials (glue, in particular) and manpower are still in short supply.

Guatemala

• Hardwood exports are said to have been $757,573 in 1947, compared with $881,906 in 1946. By value, this was the country's fifth largest export item. The establishment of a plant for the production of high-quality hardwood plywood is reportedly under consideration.

India

• A 12-year contract for a big prefabricated housing scheme, estimated to be worth $50,000,000, has been signed with a British firm by the Indian Government. It is estimated that about 10 million houses will be produced within the contract period.

• A newsprint and paper company in India is planning to build a newsprint mill at Chandni, between Khandwa and Burhanpur, in the Central Provinces. The Government of the Central Provinces and Berar has taken up shares having a face value of 1.5 million rupees (approximately $450,000), of which about one-third was made available to the Government in exchange for extensive concessions to the company and the use of certain facilities such as water, electricity, and transportation. Other advantages include a 40-year lease to the company for exploitation of 24,000 hectares of forest land containing suitable raw material for newsprint. A softwood broad-leaved species which grows abundantly in the forest of Central India will be used. The Government also has guaranteed to furnish any part of the remaining capital not subscribed by the public within a specified period, in exchange for a share in the managing agents' commission. The factory is expected to go into production in the summer of 1949. Its initial output is to be about 100 tons daily, to be increased eventually to 400 tons daily.

• The Central Provinces and Berar Government also has subscribed 20 million rupees ($6,000,000) and 10 million rupees ($3,000,000) to another paper company, representing more than half of the issued capital. The firm will manufacture chemical and other wood pulp; writing, printing, and packing paper; and paperboard and strawboard. The plant will be located at Nagpur. The Government has agreed to lease to the Company 55,500 hectares of bamboo forests for exploitation. Machinery for the mill is to come from a Canadian firm which has contracted to participate in the capitalization of the company to the extent of 1,650,000 rupees ($495,000).

Korea

• The southern Korea paper industry carries on, but suffers severely from shortage of raw materials, electrical power, coal, etc. Paper production throughout southern Korea at the present time is of inferior quality and furnishes only about one-third of the normal requirements. Korea shares with China the distinction of producing some of the earliest papers known. Made by simple hand processes of selected native materials, these papers still find wide use in the building trades.

Ninety percent of the country's pulpmaking capacity is in the dense pine forests of northern Korea, while in southern Korea are the smaller nonintegrated paper mills dependent on the North for their raw materials. Not until the 1930's did Japan initiate on an expanding scale the manufacture of pulp or paper in northern Korea. Plants making mechanical sulphite and dissolving pulps were erected on the Manchurian border and on the east coast, as well as paper mills in various parts of the country. The yearly production in 1938 reached 38,000 tons of wood pulp and 8,300 tons of paper. The surplus of the pulp, together with the bulk of the paper production, was exported to Japan. Very little was contributed to the paper economy of south Korea, since statistics show that paper consumption in this region was less than one pound per caput a year. In line with the wartime program of decentralization, the Japanese began in 1939 to move a number of mills to Korea. Certain of these mills were transferred to southern Korea. Production per mill varied from 70 to 80 tons per month. This migration of paper mills to Korea continued throughout the war and was not entirely completed at the time of liberation.

Mexico

• A new kraft mill at Atenquique in the state of Jalisco, constructed in 1946, reached its production capacity of 120 tons of unbleached sulphate pulp daily in June 1947. Kraft paper is made from this pulp at the estimated rate of 18,000 tons annually.

A mill in Mexico, D. F., began operations in June 1947 for the production of paperboard and wrapping, bond, and mimeograph papers. Machinery from the company's old mill was used, and additional machinery and equipment was installed at the new mill.

The first mill in Mexico to manufacture facial tissue started operation late in December 1947. The mill also will manufacture toilet paper; production of all tissues will be approximately 1,200 tons annually.

A long-established mill in the Federal District was installing new machinery and equipment in June 1948. The additions included a modern 340 centimeter (134 inch) Fourdrinier paper machine for lightweight papers, a mechanical pulp mill, a steam power plant, and accessory equipment. Another mill in the Federal District began to operate one of its two machines early in 1948, and the second was in the process of installation in June 1948. The mill will produce coarse wrapping paper and paperboard from waste paper; imported pulp will not be required. A second paperboard plant, which will use imported pulp, is located at Tlalnepantla and is expected to begin operations by the end of 1948. A plant for the production of cigarette paper and various types of tissues, also located at Tlalnepantla, was expected to start production sometime in 1948.

Plans have been made to build a kraft paper mill near Monterrey, according to a report of several months ago. Pulp for the paper would be purchased from the United States or Canada. Although the plant is to have only kraft paper-making equipment at the start, equipment for grinding pulpwood into pulp may be installed later. In April 1948, a project was being studied by the Union de Madereros (lumbermen's union) de Chihuahua for the construction of a wood pulp mill and a paper manufacturing plant in the state of Chihuahua.

Netherlands

• The Dutch government has contracted for the delivery from Finland of 100 wooden schools to be delivered in ready-made elements. Fifty schools were to be delivered before the end of 1948, the remaining 50 at the beginning of 1949. The foundations were prepared before the schools arrived in Holland, and a school with six classrooms was to be completed within 80 days. The schools are delivered with five, six, seven, or eight rooms, completely arranged with central gas-heating, accommodations for the head teacher, washrooms, etc. They are not intended as provisional accommodations but as permanent buildings.

Newfoundland

• The largest newsprint machine in the world has gone into operation at Corner-brook Mill, making this the largest integrated pulp and paper mill in existence. Newsprint 676 centimeters (266 inches) wide will roll from the new machine at a maximum rate of 610 meters (2,000 ft.) per minute, giving the unit a capacity of 100,000 tons per year and making the an-

nual capacity of the mill about 300,000 tons of newsprint and 55,000 tons of exportable sulphite pulp. The machine, which took two years to build, was 60 percent Canadian made, 30 percent British, and 10 percent U. S.

Scandinavia

• A general analysis of the history of the wood industry in Norway, Sweden, and Finland shows a continuous progress from west to east and the influence of domestic and foreign factors. It might be said that Norway, with comparatively restricted forest resources, has already passed the lumber production stage and is now concentrating on finished products, while Finland is still at the first stage, since lumber and other semi-finished products still constitute the major part of its production. Sweden is in a position halfway between these two.

At the beginning of the seventeenth century, Sweden and Finland together exported an annual total of 1,500 standards only, whereas Norwegian exports amounted to 50,000 standards. At the beginning of the nineteenth century, Norwegian exports totaled 250,000 standards, while the combined quantities exported from the two other Scandinavian countries amounted to 30,000 standards.

Toward the end of the last century, the introduction of mechanical and chemical wood pulp as a raw material for the manufacture of paper brought about a radical change in the wood industry of these three countries. The proportion of wood pulp and its by-products in regard to the total production is increasing continuously at the expense of sawn timber. It is probable that, in the course of the next two decades, the proportion of sawn timber in relation to the total production of the wood industry will vary between 10 percent and 20 percent in all three Scandinavian countries.

Rumania

• Rumanian statistics credit the country, within its present boundaries, with 6.0 million hectares of forest, which is about 25 percent of the total area. Of this, about 500,000 hectares are in mountainous territory and are inaccessible for exploitation. Transylvania, with nearly 2.8 million hectares, contains 45 percent of the total forest area. Next in order come Moldavia, Muntenia (Greater Walachia), Banat, and Oltenia (Little Walachia). Rumania is predominantly a country of broad-leaved forests, which represent 75 percent of the total. By species, the forests are said to be distributed as follows:

Species	1,000 *hectares*	*Percent*
Conifers	1,541	26
Beech	2,364	40
Oak	1,182	20
Other broadleaf	677	11
Soft broadleaf	192	3
Total	5,956	100

By ownership, the forests are divided into: State, 24.8 percent; co operative and other public organizations, 43.2 percent; and private and local, 32 percent. As a result of the agrarian reform of 1945, the area of state and other public forests has increased at the expense of the large private forest estates.

The theoretical annual growth ranges between 1.8 to 2.5 m^3 (r) per hectare. The total growth for the entire forest area cannot amount, therefore, to more than 15 million m^3 (r). The annual cut before the war exceeded the growth. In 1939, 17.5 million m^3 (r) were cut. Firewood accounted for not less than 50 percent of the total volume cut. As a result of war devastation, many sawmills went out of operation and the annual production of timber dropped considerably. During 1945-46 (from September to September), the cut amounted to only 9.7 million m^3 (r), of which only 3.7 million m^3 (r) were sawtimber. The lumber industry showed, however, a marked revival in 1946-47, and the total was estimated to be 13.5 million m^3 (r); i.e., an increase of 40 percent in one year. A further increase is expected in 1947 and 1948.

There are in Rumania today some 730 sawmills with 1,280 saw units. Most of them are old and poorly equipped. In the villages there are also some 1,425 small water-operated sawmills. In addition, there are some 200 other wood-using enterprises of which 11 are veneer factories with a yearly output of 14,000 tons. The paper and cellulose industry is centered in 18 plants, of which only seven are of any considerable size. The total prewar annual production of cellulose and paper was 59,000 tons (1938).

Production in 1946-47 was 42,000 tons of paper and 10,000 tons of cardboard (paperboard), or nearly at the prewar level.

The export trade before the war consisted largely of unprocessed or semi-processed wood products, such as logs, box shooks, railroad ties, mining timber, balances, cordwood, etc. The total export in volume amounted in 1937 to about 2 million m^3, and in 1938 close to 1.75 million m^3.

Sweden

• A contract for the delivery of Swedish prefabricated timber houses to the Argentine Government was signed recently, after negotiations which began at the end of 1947. The delivery, comprising between 600 and 700 houses, will be completed during the summer of 1949, according to reports from the Swedish manufacturers. The houses, of three types, will be used by engineers and workmen at the large electrification projects now under way in Argentina.

• The results of an approximate survey of the Swedish consumption of fiberboards are reported as follows:

Year	*M^2 per caput*
1938	2.6
1939	3.5
1940	2.4
1941	3.3
1942	4.2
1943	3.6
1944	5.0

Turkey

• Total production of wood pulp in Turkey in 1947 was 13,500 metric tons, made up of 7,500 tons of sulphite pulp and 6,000 tons of groundwood pulp. In 1948 production was 6,700 tons of sulphite pulp and 5,600 tons of groundwood—a total of 12,300 tons. Imports of wood pulp totaled 3,860 tons in 1947, of which 2,640 tons were sulphite pulp and 1,220 tons sulphate. In 1948 the total was 6,000 tons, of which 5,025 tons were sulphite pulp and 975 tons sulphate.

United Kingdom

• From December 1945 to June 1948 approximately 280,000 houses were built or repaired in England, 250,000 of which were new and 30,000 repaired. The following figures indicate the number of permanent dwellings under construction: June 1946, 100,000 houses; June 1947, 200,000 houses; and June 1948, 170,000 houses. The highest number, approximately 220,000 houses under construction, was reached in September and October 1947. There has been a perceptible drop since that time.

United States of America

• The International Paper Company has announced that it will build a new pulp mill for the production of dissolving wood pulp used in the manufacture of rayon, cellophane, plastics, and other products. This plant will be built at Natchez, Mississippi, on a 400 hectare (1,000 acre) site and construction is scheduled for completion in early 1950. The new plant will have a yearly capacity of about 100,000 tons of dissolving pulp.

The significance of this development lies in the fact that, for the first time in the history of the manufacture of dissolving pulps, hardwoods instead of softwoods can be used, and the process is based on the sulphate instead of the sulphite process traditionally used for making such pulps. It is claimed that the new project involves radical changes in the sulphate process and entirely novel methods of purification and bleaching. A dissolving pulp is obtained which not only produces yarns and other end-products of superior strength, but which can be processed more rapidly by converting industries at lower operating costs and at a considerable saving in capital investment.

Two other American rayon producers have also embarked on dissolving wood pulp projects. The Celanese Corporation of America is constructing a dissolving wood pulp plant near Point Edward, British Columbia, with an initial annual capacity of about 75,000 tons. This plant is expected to be completed within the next two years. The Ketchikan Pulp and Paper Company, of which the American Viscose Corporation is a principal stockholder, plans to build a dissolving pulp mill at Ketchikan, Alaska, with an annual capacity of 100,000 tons, construction to begin in mid-1949.

By these three projects alone, North America's dissolving wood pulp capacity over the next several years would potentially be increased by about 275,000 tons. It is estimated that the combined dissolving and chemical grade wood pulp output of the United States and Canada in 1948 will approximate 750,000 short tons.

Union of Soviet Socialist Republics

• At the margin of the Karelian woods, near Petrozawodsk, a large factory has been built for the manufacture of prefabricated houses. This is one of 18 factories to be established in various parts of the country near forest areas, to provide housing for industrial work-

ers. The equipment of the factory will allow an annual production of 4 million two and three-room units, with a total room surface of 200,000 m^2. The first delivery is destined for the workers at Azovstal, a large steel factory on Lake Azov. Another factory for the production of prefab houses, with a similar capacity, is being completed on the Kama River, near Molotov in the Ural district.

• Southern (formerly Japanese) Sakhalin, with an area of 36,000 km^2, has 28,000 km^2 or 77 percent under forest. According to statistics for 1940, there were 235 million m^3 (r) of standing timber: spruce and fir, 182 million; larch, 15 million; and hardwoods, 38 million m^3 (r). The spruce and fir stands are of poor quality, having a growing stock of from 200 to 250 m^3 (r) per hectare. Some 750 kilometers of railway have been built. Nine pulp mills were erected. In 1946 the consumption of wood by pulp mills, coal mining, and fisheries amounted to 5 million m^3 (r). Most of the logging was done by the Paper Mills Trust, which controlled all mills. The exploitation is entirely for coniferous pulpwood and is said to be very wasteful. It is practically clear cutting of all trees down to 15 centimeters in diameter breast high. Wood down to 8 centimeters in top diameter was utilized. No trees are cut into saw timber or firewood, and the hardwoods are left standing. For every 4.5 million m^3 (r) of pulpwood, it is estimated that 7 to 8 million m^3 (r) of standing timber are actually felled. One factory had to close down in 1944 because of the exhaustion of the pulpwood supply within economic range. Five more mills may run out of supplies in another 4 to 8 years; the remaining three have supplies to last them for 14 to 20 years.

Fire control is very strict; the fires are largely confined to the cut-over areas. Because of accumulated slash and subsequent fires, because of grass, natural regeneration is made difficult. The Pulp and Paper Trust maintains about 100 nurseries and planted, with spruce and fir, more than 20,000 hectares of cutover land that failed to regenerate naturally. Planting of poplar species from Canada for some reason proved unsuccessful.

• The depletion of aspen stands available to the match industry is a serious problem. The need of finding substitutes to replace aspen as the principal raw material has been felt for the last 15 years. One-sixth of all the aspen wood received by the match industry in 1947 had to be entirely discarded as fit only for firewood. The most suitable available substitute is the wood of conifers: pine, spruce, and fir. Studies of the mechanical and physical properties of the wood of these species are under way with the indication that pine comes nearest to meeting the requirements.

Policy, Legislation and Administration

Czechoslovakia

• In July 1948, a new law on afforestation, protective forest belts, and construction of new ponds was enacted. All owners of forests under this law are made responsible for proper care and management of the existing forests and for planting new forest or protective forest belts on land not suitable for other agricultural purposes. The law further stipulates that private land may be confiscated for this purpose if such measures are necessary for improving local climatic conditions.

Italy

• A draft law to combat unemployment has been prepared by the Italian Ministry of Labor and Social Welfare. It provides for the establishment of forest camps in regions where unemployment is widespread, for the purpose of reforestation, improvement, or management of mountain forests. These camps will be organized at the request of interested private owners or upon the initiative of the Ministry of Labor and Social Welfare on land within the perimeter of the area to be reforested or to be included in a scheme of forest management by the Forest Service, which will be responsible for the technical direction of the operations and will retain ultimate control over the work done.

Each camp will have at its head a manager, who will be responsible both to the Ministry and to the landowner for its functioning and who will be authorized to employ a certain number of instructors and assistant instructors in proportion to the size of the camp.

Nigeria

• The country's main forest-policy objective is the production of the maximum benefit to the greatest number from the minimum amount of forest which is essential for the general well-being of the country. To achieve this object, two basic principles are to be observed: (a) the climatic and physical condition of the country must be preserved by the control, maintenance, or rehabilitation of vegetation, of the rainwater run-off in those areas where lack of control would cause damage to other lands or waterways and endanger water supplies and soil fertility; (b) the supply in perpetuity of all forms of forest produce to satisfy the wants of the people must be assured by the acquisition and preservation of an adequate forest estate. The development of Nigeria makes it imperative that the area of land required for the growth of forest produce be reduced to the absolute minimum. Unassisted natural forest must, therefore, be developed under controlled and planned management. Since planned management is impossible without security of tenure, first attention must therefore be given to the secure establishment of the forest estate, with a balanced distribution throughout Nigeria as far as natural and other circumstances permit.

Personalities

• As a result of a recent decree which elevated the Forestry Division in the Ministry of Agriculture of the Argentine Republic to the stature of a Department of Forests, its Director, Lucas A. Tortorelli, has become its Director-General. Jorge N. F. Carmelich has received the title of Inspector-General.

• Pierre Terver, who has been with the Forest Products Branch of FAO's Division of Forestry and Forest Products in Washington for the past year, has been appointed Chief of the Division's Latin-American Working Group. This Group will have offices in Rio de Janeiro. Mr. Terver is at present touring countries of Central and South America, making arrangements for a first meeting of the Latin-American Commission on Forestry and Forest Products, the establishment of which was recommended by the Teresopolis Conference in 1948.

• Herman Haupt Chapman of New Haven, Connecticut, U.S.A., professor emeritus of forest management at Yale University and past president of the Society of American Foresters, was awarded the Sir William Schlich memorial medal on December 17 at the annual meeting of the Society held in Boston, Massachusetts.

In honor of Sir William Schlich, an eminent international leader in forestry, a fund was established fifteen years ago by foresters of English-speaking nations in recognition of Sir William's great services to forestry in India, England, and throughout the world. The Society of American Foresters is custodian of the periodic grants made to the United States by the Schlich Memorial Foundation, and from time to time awards the Schlich memorial medal for noteworthy achievement in the advancement of forestry.

It has been previously presented to only four other persons: Franklin D. Roosevelt, Gifford Pinchot, Henry S. Graves, and William B. Greeley. Presentation of the medal to Dr. Chapman was made by Clyde S. Martin, president of the Society of American Foresters.

• The FAO staff in the Geneva Forestry Office was increased last November by the appointment of a new Technical Officer, Mr. Eero Kalkkinen. Mr. Kalkkinen studied in the University of Helsinki and specialized in the fields of Economics and Business Administration. Before joining FAO, he worked with commercial firms both in Belgium and in the United Kingdom. Mr. Kalkkinen is attached to the Forest Products Branch.

• Tuttu Tarkiainen has recently joined the Forest Products Branch of the Division of Forestry and Forest Products. Dr. Tarkiainen, after attending the Geneva School of International Studies, served in the diplomatic service of Finland from 1934 to 1944, being Attaché of the legation in Moscow for two years and afterwards First Secretary and Chargé d'Affaires a.i. in Rome. From August 1944 to November 1945, he was Chief of the Commercial Division and auxiliary Director of the Central Association of Finnish Woodworking Industries, and then for three years Commercial Advisor at the head office of the Enso-Gutzeit Osakeyntio Concern at Helsinki. Amongst other positions which he has filled, Dr. Tarkiainen was secretary of the Finnish Group of the Interparliamentary Union, 1938-1939, secretary of the Finnish Delegation during commercial negotiations with Sweden, 1941-1943, and member of the Finnish delegation during commercial negotiations with France in 1942 and with Denmark in 1947. Before joining FAO, he served also as secretary-general of the National FAO Committee of Finland.

Reviews

In view of the interest that the book must present to foresters and to students of that long-range trend that is bringing all natural renewable resources under control, and in view of the fact that Zon was both an old friend of Gifford Pinchot and very much bound up with all the struggles and controversies described, UNASYLVA *has departed from its usual custom by presenting a signed review.*

Breaking New Ground. By Gifford Pinchot. 550 pp. Harcourt, Brace and Company, New York. $5.

Reviewed by RAPHAEL ZON

This is the story of a very exciting and epic period in the struggle for the development of a National Forest Policy in the United States. Although played out on the American scene against the background of American economic and political conditions, this struggle has world-wide implications. It is a pattern which many countries, rich in natural resources, invariably do go through at an earlier or later stage in their development, with different political and economic modifications, of course, peculiar to them, in evolving a rational policy in the handling of their forests and other natural resources. This struggle may differ, therefore, in intensity and form in different parts of the world, but the essence of the pattern remains very much the same. Since there are still many countries which are just now going through the process and still others which are just awakening to the need of a practical conservation program, the U. S. experience as depicted in *Breaking New Ground* should prove of absorbing interest and benefit.

The international sweep and significance of the book is heightened in particular by the fact that it is not only the story of how practical forestry came to America but also of how the fight for forestry gave birth to a world movement for conservation of all natural resources —a program that has now become in a large measure the creed and goal of some 58 nations which voluntarily banded together into what is known as the Food and Agriculture Organization to make this program a reality.

As early as 1909 Pinchot already envisaged the need for some international organization like FAO. This is clear from the Aide-Memoire prepared by him and sent to the principal governments to sound them out informally whether they would look with favor on sending delegates to a world conference on conservation. The points which he emphasized in that Aide-Memoire were that the people of the whole world are interested in the natural resources of the whole world; that they are benefited by the conservation of these resources and injured by their destruction; and that the people of every country are interested in the supply of food and of material for manufacture in every other country. This is not only because these are interchangeable in trade, but because a knowledge of the total supply is necessary to the intelligent treatment of each nation's share of the supply. The Aide-Memoire significantly concludes with the statement that reading the lessons of the past aright, it would be for such a conference *to look beyond the present to the future.* Pinchot always looked upon an international conference on conservation merely as a precursor, as a first step toward a permanent international organization. Since the responses to this Aide-Memoire were favorable, invitations were sent to 48 nations to meet at the Peace Palace at the Hague in September 1909. Thirty of the nations, including Great Britain, France, Germany, and Canada, had already accepted when a change of the administration in March 1909 indefinitely delayed the plan. Pinchot later made two attempts to revive it, but without success. However, he did not stop agitating for it. In a talk before the Eighth American Scientific Congress in May 1940 in Washington, he contended that international cooperation to survey, conserve, and wisely utilize natural resources to the mutual advantage of all nations might well remove one of the most dangerous obstacles to a just and permanent world peace. In 1944 he laid the plan before President Franklin D. Roosevelt, who grasped the full implications of the idea and expressed the desire for rapid action. His untimely death left it to President Truman to carry out the plan. A few days before Pinchot's death, President Truman sent to the Economic and Social Council of the United Nations the plan embodying the idea of a World Conservation Conference. In March 1947 the United Nations approved the plan, and a United Nations Scientific Conference on Conservation and Utilization of Resources was authorized to be held in June 1949. While efforts were made to call a World Conference on Natural Resources, the FAO came into being (in October 1945). Its creation was an answer to Pinchot's prayer, a fulfilment of his hopes, even before the World Conference on Resources, upon which he counted merely as a stepping stone for a permanent organization, had actually taken place. Part Ten of the book entitled "A World Movement is Born" should carry, therefore, a particularly strong and intimate appeal to all member nations of the FAO.

But to come back to the main story itself. It begins in 1889 when Gifford Pinchot, just out of Yale, decided to make forestry his profession and set off to Europe to get the scientific training that could not be obtained then in the United States. His choice fell on the French Ecole Nationale Forestière—probably because his grandfather was French, a soldier of Napoleon.

When Pinchot returned at the end of 1890 to the United States, he found the country obsessed by a fury of agricultural and industrial expansion. New railroads were opening new territory; settlers were pushing farther and farther into the wilderness. Wood—and plenty of it—was needed; without it the United States could never have reached the high degree of comfort, progress, and power it now enjoys. But hand-in-hand with this expansion there was also going on the most rapid and most wasteful forest destruction ever known. The Federal Government was disposing the public land as fast as it could to states and railroads in the form of grants. The Northern Pacific Railroad, for example, received almost 40 million acres; the States in turn passed on their timberlands into private ownership. North Carolina, for instance, has disposed some of its finest hardwood forests for 10 cents an acre. The richest government timberlands could be legitimately bought for $2.50 an acre. Mining companies helped themselves each year to many millions of feet of government timber, for which they paid nothing. Stealing government timber was almost a common and normal occupation. Forest fires raged unchecked. They were regarded as acts of God, beyond human control. Twelve million acres of timber burning up annually did not shock the public conscience. Forest devastation was regarded as normal, and forest regeneration as a delusion of fools. Sustained yield was an unknown concept. There were no forest schools, no trained foresters, and not a single acre of government, state, or private timberland was under systematic forest management. Such was the situation in the United States at the end of the last century.

In July 1898, Pinchot became the first Federal Forester. His offices consisted of two small rooms on a top floor of an old building, long since torn down. His entire staff, including himself, was made up of eleven people. Of these, only two had some forest training abroad. The annual appropriation was $28,500, and the entire equipment consisted of one tape measure, one pair of calipers, and one increment borer. In the course of one decade, there occurred an almost revolutionary change in the government land policy and in the public attitude toward the forest and the rest of the natural resources—water, soil, grazing, water power development, reclamation of arid lands, flood controls, and inland waterways. For ten years it was a strenuous fight against the greed of private interests, bureaucratic corruption, and public indifference to show that sound forestry can produce lumber without destroying the forest. The movement became a veritable crusade; hard battles were raging in the halls of Congress; conservation became a political issue in a Presidential campaign; the issues were carried to the highest courts of the land; and public opinion was greatly aroused. The old order was dying hard. The conservationists, thanks to the enthusiastic support of the then President Theodore Roosevelt, finally won a large measure of the needed reform, and Pinchot at the end of his life could

look with proper pride on the structure for which he laid the solid foundations: some 179 million acres of National Forests under management by some 2,600 professional foresters; 12 million acres of state forests also under management by trained foresters; 9 Regional Forest Experiment Stations and a unique institution—The Forest Products Laboratory—devoted to the study of wood in all its aspects; and 29 forest schools of college grade, with a total enrollment of about 7,900 students and an annual graduating class of some 1,500 young foresters. Controlled grazing on public land and fire danger to the forest were reduced to an insurable risk. The task, however, still remains unfinished, because a vast area of privately owned forests is still largely lacking systematic forest management. This is a battle that is still to be won.

Since the story is told by a man who was one of the main actors in the entire struggle, the book takes the form of an autobiography. You can sense throughout the entire book the vigor and strenuousness of the life the author lived. Accounts of political battles in Washington alternate with stories of adventure in the wilderness of a vast unexplored land. Such is the story of a great popular movement and its great leader, whose guiding principle in life was, "The public good comes first."

ECE/FAO Quarterly Bulletin — Timber Statistics, Vol I, No. 3.

Latest figures on timber production, stocks, exports and imports of most of the countries of Europe with the U.S.A. and Canada, are reported in the third Quarterly Bulletin of Timber Statistics, published jointly by FAO and ECE at Geneva. The information covers data for nine months of 1948, compared with data for the same period of 1947. The Bulletin is issued in a bilingual English/French edition, and is on sale by FAO and sales agents for United Nations publications.

Journal of Range Management. Vol. 1, No. 1, 1948. Baltimore, Md., U. S. A. Published Quarterly by the American Society of Range Management. Subscription $3.00, single copies $1.00.

In 1947 the American Society of Range Management was organized. It has set as its objectives "To foster advancement in the science and art of grazing land management, to promote progress in the conservation and greatest sustained use of forage and soil resources, to stimulate discussion and understanding of scientific and practical range and pasture problems, to provide a medium for the exchange of ideas and facts among society members and with allied technologists, and to encourage professional improvement of its members." Although range management has since the early years of the century been a major part of forest and wildland management, this is the first professional society available to range management researchers, teachers and managers. Volume 1, number 1, of the Journal contains articles describing the Society and the Journal, and giving the Constitution and By-Laws, as well as the officers, council, committees and members, the latter now numbering over 650. There are four technical articles on "Milestones in Range Management," "Getting New Range Plants into Practice," "Succession in Sagebrush," and "The Mulch Layer of California Annual Ranges." News and notes, book reviews and a bibliography of current range literature are other departments. Reports on significant research and experience, as they appear from time to time, may well prove of value in other countries as well as the U. S. A.

ERRATA

VOL. II, No. 5

Page 227.
Table I (A), column headed "Government Services."
Against Morocco for 6,667 read 34; for 21,679 read 356.

Page 242.
In first paragraph of "Summary," substitute as follows—
line 10, citrus 259 million board feet
line 16, picking boxes 29 million board feet (0.07 million $m^3(s)$)
line 18, dehydrator trays 3 million board feet (0.009 million $m^3(s)$)
line 19, sweatboxes 5 million board feet (0.011 million $m^3(s)$)

Page 251.
Right column, line 4 of article *Forestry in Iraq*
for *P. monagyna* read *C. monagyna*

Page 267.
Footnote to table "European Newsprint Production" should read
"Exclusive of the Soviet Zone" and refers to the figures for Germany in 1946 and 1947. Other symbols should be deleted.

Page 271.
Left column under *United Kingdom*, 4th paragraph,
For 379,000 tons read 1,300,000 tons.
5th paragraph,
For 391,000 tons read 220,000 tons.

Page 287.
"Soil and Water Conservation in the Punjab" by R. Maclagan Gorrie, D. S. O., F. R. S. E., Indian Forest Service, was erroneously quoted as published by the author. It should read published by the Government Printer, West Punjab, Lahore. Price 7s.6d.

VOL. II, No. 6

Page 321.
Right column, first paragraph, last line.
For P50.5 million read P32.5 million.

Page 333.
Under Japan, first paragraph, line 13.
For 17,225 million m^3 read 1,225 million m^3.

THE Nations accepting this Constitution, being determined to promote the common welfare by furthering separate and collective action on their part for the purposes of

raising levels of nutrition and standards of living of the peoples under their respective jurisdictions,

securing improvements in the efficiency of the production and distribution of all food and agricultural products,

bettering the condition of rural populations,

and thus contributing toward an expanding world economy,

hereby establish the Food and Agriculture Organization of the United Nations . . . through which the Members will report to one another on the measures taken and the progress achieved in the fields of action set forth above.

—Preamble to the Constitution of the Food and Agriculture Organization of the United Nations

FAO Member Nations

AUSTRALIA
AUSTRIA
BELGIUM
BOLIVIA
BRAZIL
BURMA
CANADA
CEYLON
CHILE
CHINA
COLOMBIA
COSTA RICA
CUBA
CZECHOSLOVAKIA
DENMARK
DOMINICAN REPUBLIC
ECUADOR
EGYPT
ETHIOPIA
EL SALVADOR
FINLAND
FRANCE
GREECE
GUATEMALA
HAITI
HONDURAS
HUNGARY
ICELAND
INDIA
IRAQ
IRELAND
ITALY
LEBANON
LIBERIA
LUXEMBOURG
MEXICO
NETHERLANDS
NEW ZEALAND
NICARAGUA
NORWAY
PAKISTAN
PANAMA
PARAGUAY
PERU
PHILIPPINE REPUBLIC
POLAND
PORTUGAL
SAUDI ARABIA
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SWITZERLAND
SYRIA
TURKEY
UNION OF SOUTH AFRICA
UNITED KINGDOM
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VENEZUELA
YUGOSLAVIA